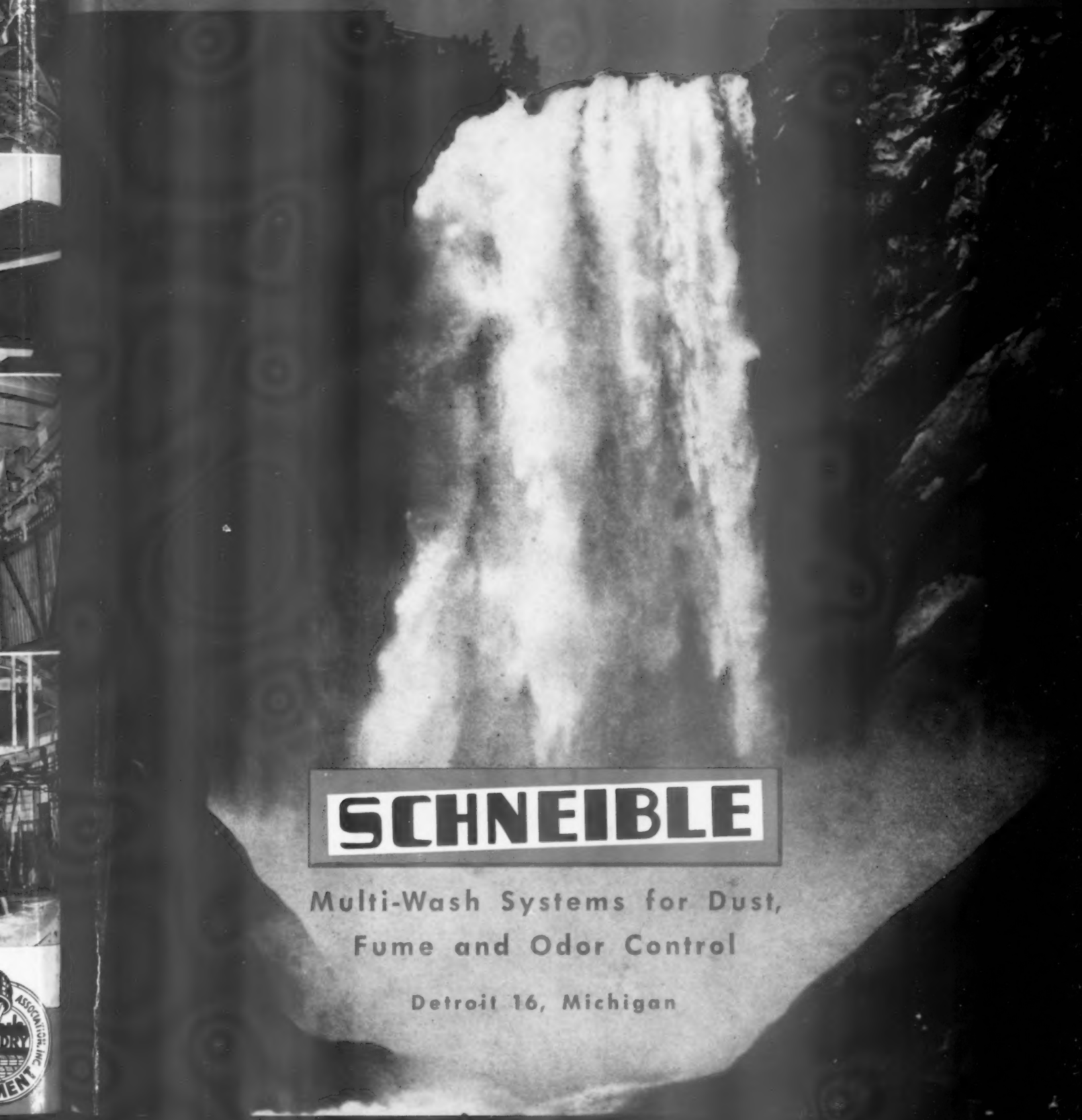
April 1949

THE FOUNDRY

wherever metals are cast...

TECHNOLOGY DEPARTMENT



SCHNEIBLE

Multi-Wash Systems for Dust, Fume and Odor Control

Detroit 16, Michigan

the Camera Proves the Value of PURITE

IN REFINING CUPOLA CAST IRON!

MICROPHOTOGRAPHS OF GRAY IRON CASTINGS

(500 X Unetched)

Untreated Iron

Iron Treated with 4 lbs. of Purite per ton

ANALYSES AND TESTS

.137%	Sulfur	.104%
.93	Combined Carbon	.79
3.38	Total Carbon	3.36
1.84	Silicon	1.83
.30	Manganese	.27
.53	Phosphorus	.54
32,020 lbs.	Tensile Str. Per Sq. In.	33,750 lbs.
226	Brinnell Number	220
30*	Machinability	20*

* *Time in seconds required to drill through 1" test bar with ¼" twist drill at 50 lbs. pressure and 1,700 r.p.m.*

Refining with Purite—in the cupola hearth or in the ladle—has found favor with foundrymen for over 25 years. This scientific flux not only removes sulfur, it purges molten metal of occluded gases, entrained oxide-silicates and other non-metallic impurities. Purite makes possible improved grain structure and machinability... faster production of cleaner, sounder castings.

As a typical example, Mathieson shows the effect of desulfurizing and refining with Purite in a U-shaped mixer ladle. Microphotographs, analyses and tests—made before and after treating iron with Purite—clearly illustrate the manner in which Purite reduces the size of graphite flakes, cleans the metal, and improves the strength and machinability of gray iron castings.

99% PURE FUSED SODA ASH

PURITE

The Scientific Flux for Better Melting and Cleaner Iron

We'll be glad to tell you more about this inexpensive means of improving your castings. Write for free information. Mathieson Chemical Corporation, 60 East 42nd Street, New York 17, N. Y. In Canada: Railway & Power Engineering Corporation, Limited

Mathieson
CHEMICALS

Purite (Fused Soda Ash) . . . Liquid Chlorine . . . Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda . . . Ammonia, Anhydrous & Aqua . . . Sodium Chlorite Products . . . Chlorine Dioxide HTH Products . . . Dry Ice . . . Carbonic Gas . . . Sodium Methylate

Omega chisels hold a cutting edge

Omega is primarily a tough, shock-resisting tool steel, but its normal working hardness at the cutting edge ranges from 58 to 60 Rockwell C. That's plenty hard enough to keep that cutting edge sharp for biting into the tough hides of rough castings.

Omega is the old reliable of chisel steels, combining just the right amount of shock-resistance with hardness and ductility. It's engineered for pneumatic chisels, core breakers, and other shock tools for severe cold-battering service. Shanks are tough and non-peening.

This fine-quality tool steel is easy to forge, re-dress, and heat-treat. Harden it in either oil or water.

Whether you make up your own chisels or buy them finished, you'll like the way Omega stays on the job longer . . . cutting more metal faster. Give it a trial and you'll see what we mean.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
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★ BETHLEHEM STEEL ★

OMEGA . . . one of Bethlehem's Fine Tool Steels

A good performer *deserves* an encore.....

and this explains the repeat orders for Federal

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APRIL, 1949

THE FOUNDRY

VOLUME 77—NUMBER 4

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A Twenty-five Year Record of . . .

CLEANER CASTINGS . . . EASIER SHAKE

"We use LINOIL all the way through our foundry, and have done so continually for the past twenty-five years," says Adam Pietz, Vice President and Foundry Manager of the Iowa Steel and Iron Works, who has been with Iowa Steel for thirty-eight years. "Our scrap report seldom shows a casting scrapped for core failure."

In a Diesel engine block casting, the interior (the cored surface) is subject to extremely close and accurate machining. This cored surface must therefore be smooth, and LINOIL'S low gas ratio helps smoothness by preventing scabs and blows. It must be clean . . . LINOIL'S high baked strength resists washing and burn-ins; yet LINOIL'S quick collapsibility keeps shakeout time to a minimum.

Experience at Iowa Steel shows that LINOIL'S uniform performance helps maintain high quality on this job as it has on thousands of other jobs during the last quarter-century.

A six cylinder Diesel engine block cast at Iowa Steel for Buda Mfg. Co. The block weighs 1980 pounds . . . 2400 pounds of metal poured.

Bottom view of the same block. A high tensile (45,000-50,000) iron containing 55% steel is used. Pouring temperature is 2500°

OUT...with LINOIL

at IOWA STEEL and IRON WORKS

CEDAR RAPIDS, IOWA

Inspecting 1400 pounds of LINOIL cores in the drag of a Diesel engine block mold.

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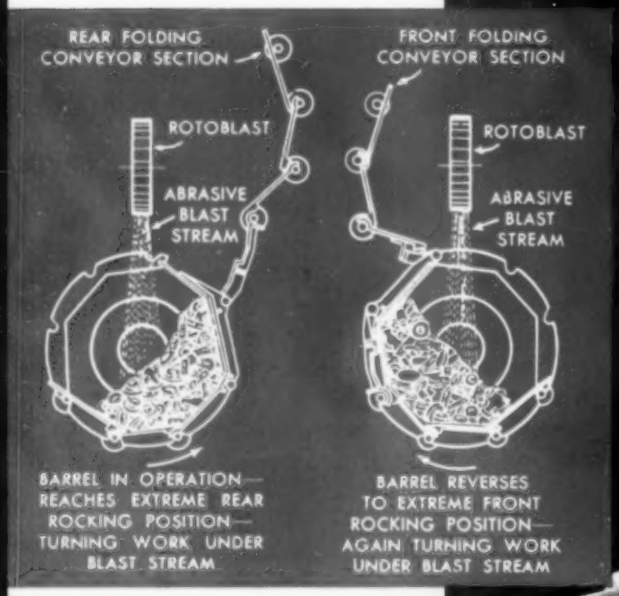
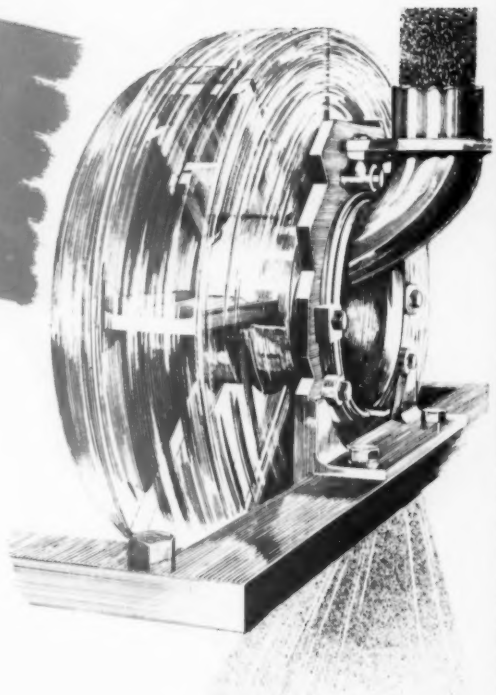

REAR FOLDING CONVEYOR SECTION
ROTOBLAST
ABRASIVE BLAST STREAM
FRONT FOLDING CONVEYOR SECTION
ROTOBLAST
ABRASIVE BLAST STREAM
BARREL IN OPERATION—REACHES EXTREME REAR ROCKING POSITION—TURNING WORK UNDER BLAST STREAM
BARREL REVERSES TO EXTREME FRONT ROCKING POSITION—AGAIN TURNING WORK UNDER BLAST STREAM

Rocker Barrel Action, a Pangborn exclusive, turns the work for complete and even ROTOBLAST cleaning on all sides . . . even deep down in intricate cores. Pangborn ROTOBLAST and Rocker Barrel Action can pay off for you.

Pangborn

* Trademark of Pangborn Corporation

blast cleaning bottlenecks on mechanized molding loops



AT a large mechanized foundry two Pangborn ROTOBLAST Barrels, 28 and 14 cubic foot capacities, clean castings *as fast as three mechanized molding loops can produce them!* Big, oversize castings are handled equally fast by a Pangborn Airblast Room! Now cleaning bottlenecks are entirely *eliminated,* allowing full production possibilities to be realized!

Casting breakage is reduced to near-zero figures . . . production is boosted sky-high, averaging 160 tons a day. And . . . complete cleaning is assured because Pangborn ROTOBLAST Barrels get all surfaces and pockets really clean . . . no matter how intricate the castings may be!

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BLAST CLEANS CHEAPER

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Champion TO BETTER

A NEW MACHINE INTRODUCED *A NEW WAY* GIVES EVERY FOUNDRY AN OPPORTUNITY TO "CHAMPION-IZE" FOR HIGHER QUALITY AT LOWER COSTS.

IF you have been debating the question of installing core blowers, this message is intended especially for you. A new model Champion core blower, the "Junior", just announced to the industry, has the answers to your questions:

A CHAMPION BLOWS BETTER CORES FASTER, EASIER, AT LOWER COST!

From the giant CB-400 down to the CB-5 ("Junior"), the same advanced engineering features, precision construction and smooth operation of any Champion Core Blower give instantaneous action, uniform quality, with effortless ease.

By eliminating lost motion, spoilage and waste, by producing uniformly high quality product, and by making man-power more productive, Champion Core blowers have won a firm place in the foundry picture.

Take advantage now of the new introductory offer, to see what the "Champion Method" will do for you.

1. IS CORE BLOWING PRACTICAL FOR ME?

With the "Junior" machine, even the smallest foundry which produces duplicate castings will find it worthwhile to blow their cores.

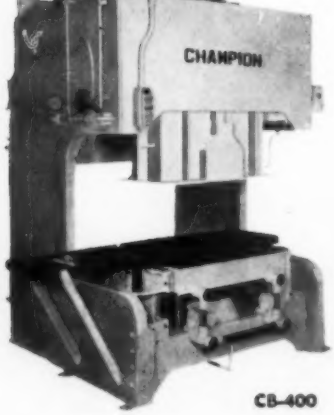
At a small investment, you have all the features of speed, uniformity and ease of handling that are characteristics of the largest model Champion.

2. HOW LONG DOES IT TAKE TO CHANGE OVER?

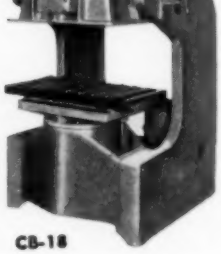
You'd be surprised! The introductory plan eliminates all red tape and unnecessary delay.

3. HOW DO I GO ABOUT IT?

Just send us a metal core box for the core you wish to blow with your order for a Champion CB-5 (the "Junior"). We will prepare the box for blowing, adjust the blower to the box, and ship the whole outfit to you without delay. When the machine arrives, merely connect your air pressure, fill the hopper with sand, and you're ready to go!



CB-400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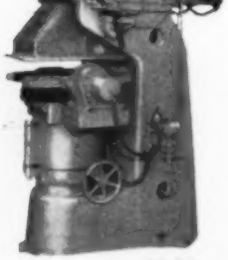

CB-15

CB-12

CB-10

Clears the Way!-

CORE PRODUCTION

"JUNIOR"

IS A TRUE CHAMPION WITH ALL CHAMPION FEATURES

There's really so little work required that many foundrymen have difficulty believing their eyes, when they first try out a Champion. Swing the head to the left under the hopper and fill the magazine with sand. Then swing it back in blowing position, with box in place. A simple easy movement of the valve lever instantly operates both horizontal and vertical core box clamps and blows the core.

Any Air Line with 85 Lbs. Pressure Is Adequate to Operate Any Champion Core Blower.

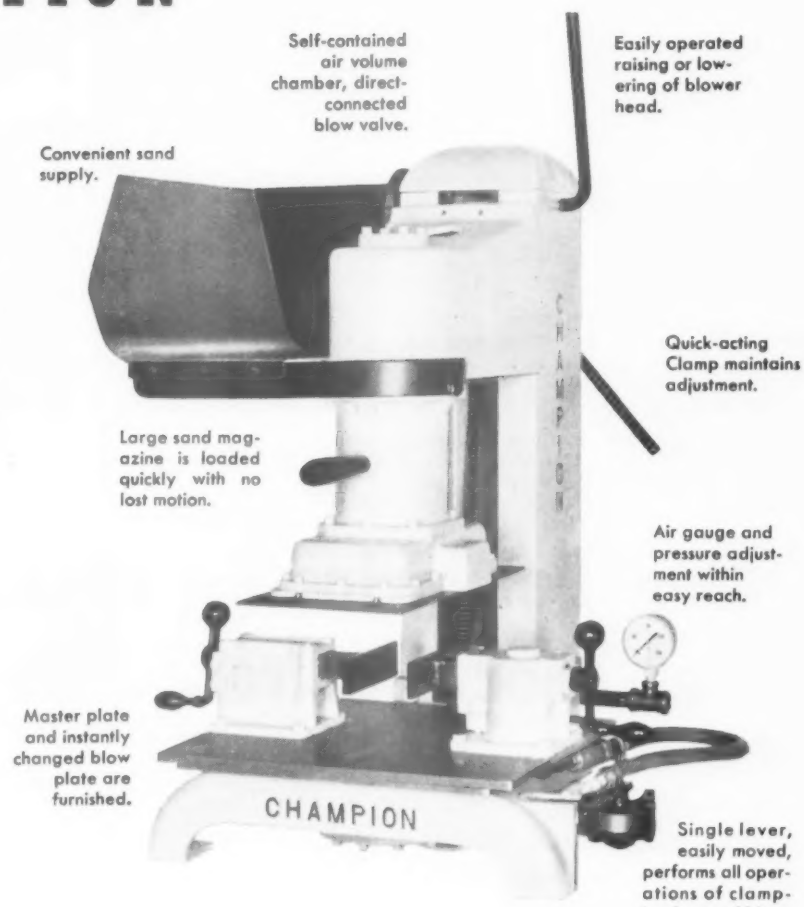
• • •

***Again* HERE'S ALL YOU HAVE TO DO:**

Send us a core box to be used with a CB-5 core blower, along with your order. The machine will be shipped to you *ready to operate.* Merely supply air at 85 lbs. and sand.

• • •

Champion engineers and production specialists are glad at all times to give you the benefit of their long experience in helping you solve any mold or core making problems.


Self-contained air volume chamber, direct-connected blow valve.
Easily operated raising or lowering of blower head.
Convenient sand supply.
Quick-acting Clamp maintains adjustment.
Large sand magazine is loaded quickly with no lost motion.
Air gauge and pressure adjustment within easy reach.
Master plate and instantly changed blow plate are furnished.
CHAMPION
Single lever, easily moved, performs all operations of clamping box and blowing core.

To change from one core box to another, from one type to another, is the work of a minute or less. Blow plate is instantly removable, without use of bolts, screws, clamps or latches. Base plate with air-operated clamps for vertically split boxes, is also instantly removable by merely lifting it off; no tools needed, no mechanical fasteners involved.

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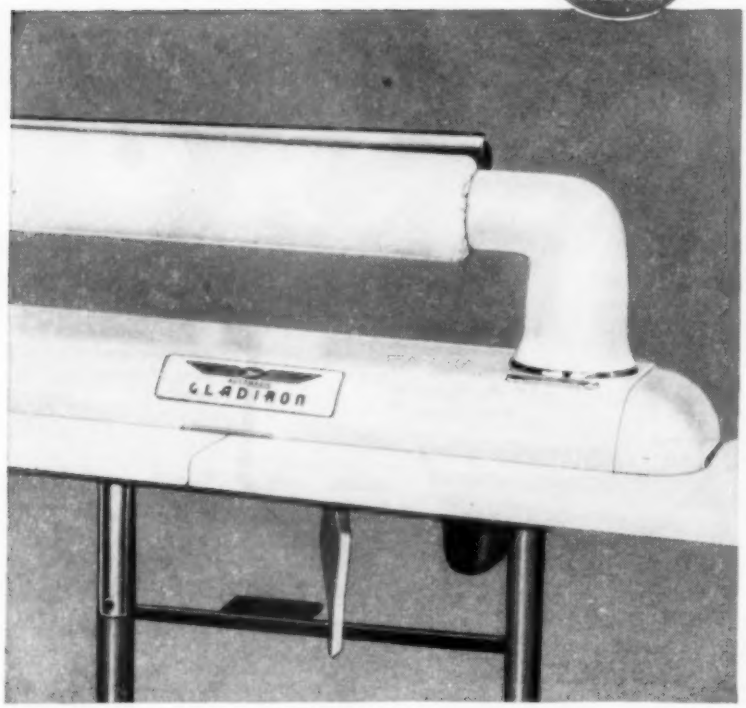
ANOTHER 3M COMPANY SERVICE STORY



The flawless finish on this Thor Gladiron* is obtained with belt grinding operations suggested by 3M Methods Engineers. This fast, efficient finishing method helps maintain a low retail price.

Polishing Gladiron* gray iron drive housings on one of several backstand belt grinders now in use by Thor cuts finishing time in half. This *one operation alone* saves $6000 a year in finishing costs.

How belt grinding saved the makers of Thor Gladirons* $20,000 a year

Since a 3M Methods Engineer surveyed the grinding and finishing operations at the Thor Corporation . . . many former metal finishing methods have been replaced with 3M Abrasive Belts. Cost analyses show belt grinding is saving Thor $20,000 annually, over previous methods of metal removal and polishing.

The 3M Method of Grinding and Finishing metals, wood, glass or plastics . . . is a production line technique that replaces conventional methods of stock removal and polishing. Our Methods Engineers are trained in the mechanical application of coated abrasives, and are familiar with all metal finishing systems.

*REG. U. S. PAT. OFF.

Made in U.S.A. by **MINNESOTA MINING & MFG. CO.**, *St. Paul 6, Minn.*

The attached coupon is your invitation for a 3M Methods Engineer to analyze your grinding or finishing operations. No obligation, of course.

Please send me a copy of your "Step Up Production" booklet.
Please send a 3M Methods Engineer to call on us. F-449

*Name*_____

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LET'S KICK IT AROUND

By TOM BARLOW

Breathes there the foundryman, with soul so very dead,
Who never to himself hath sorroufully said,
"There's something wrong with this here damnable coke bed."

—Apologies to everybody

Did you ever stop to think how many things can go wrong with a coke bed? If I worked for a coke company instead of a bond-clay company (also bentonite, core paste, plastic blow-tubes, cupola patch gun, Westonite, etc., etc., etc. — call Jackson 307 and ask for Lois), my advertising slogan would be, "No foundryman ever went wrong on a Barlow coke-bed!"

I'll never forget one coke bed that will live through fable and folk song for many generations. A foundry developed an epidemic of cold iron for no good reason. Experts searched high and low, but no change had been made. The coke salesman, when interviewed, refused to take the blame. Ditto the scrap dealer and molders' union.

Finally the truth came out. The cupola had been hand-charged over a sill about thirty inches above the charging floor level. Someone decided that the chargers would be happier if the sill was lower. They cut off about 24 inches and lowered the sill almost to the floor. That part was O.K., but nobody told the man who measured the coke bed. Every morning he carefully measured the bed level — from the sill down. Dropping the sill 24 inches automatically dropped the bed by the same amount. "Elementary, my dear Watson" — but oh, brother, try to find something like that when you are looking for a technical and highly scientific explanation of another "act of God."

Sometimes there are very logical reasons for coke bed trouble, particularly when we "get cold iron at 10:30 every morning". How many foundrymen buy cheap clay and patch ganister on the perfectly logical theory that it will just burn out anyway? (I use the same argument when the "boss" tells me to get a haircut — "it will just grow back again".) But suppose we start the day with a cupola lined or patched to 60 inches and put in a 60-inch bed. Now, because the patch is wet or made up entirely of "cheap" junk, it burns out to about 70 inches in the first hour (it can happen). Now the coke, which filled a 60-inch cupola to 60 inches above the tuyere, is only high enough to reach 43 inches above the tuyeres. Would you like to run a 70-inch cupola with a 43-inch bed?

Fortunately, a cupola will adjust itself if given a chance and given enough time. The bed will come up, but you'll get cold iron in the meantime. You might also get "oxidized" iron, hard spots, "dead" iron, high shrinkage, etc. As if that wasn't enough, you now have a 70-inch cupola and are feeding it air as if it were 60 inches. That's just about like trying to feed Humphrey Pennyworth in a tea room. It's something that just can't be done.

We talk about uniformity in a cupola, but the only uniformity that counts is *inside* the cupola. If the inside is screwy, it won't help to hang ornaments on the outside. Speaking of uniformity reminds me of the "Case of the Shrinking Bed." Over a period of time, a foundry noticed what looked like a low bed. They finally checked and found that it actually was low, although the "sheet" said that it was just the same as the "super" originally specified. They found that the bed was measured by lowering a light chain from the charging floor. That's common practice. In this case, however, because the bed was measured hot, and, because the chain was light iron, *the chain had grown 14 inches* since it was first used.

For those that like formulas for figuring coke beds, I can pass on one I got from an old foundryman who has long since tapped his last cupola.

$$C.B.H. = 10\sqrt{P} + 9 + H.M.$$

C.B.H. is coke bed height
P equals pressure
H.M. is "How Much more coke does it take to get hot iron?"

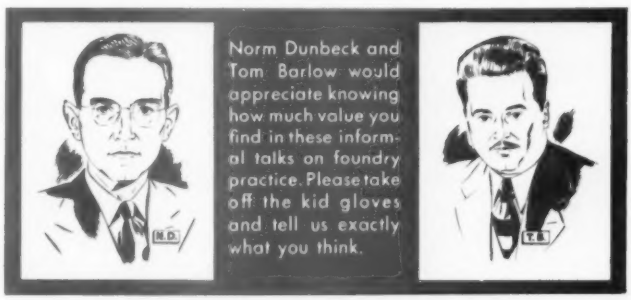
That formula may not mean much, but at least it has never been known to go wrong.

★ ★ ★

EASTERN CLAY PRODUCTS, Inc.

"Bonding clays sold with service"

JACKSON, OHIO


N.D.
Norm Dunbeck and Tom Barlow would appreciate knowing how much value you find in these informal talks on foundry practice. Please take off the kid gloves and tell us exactly what you think.
T.B.

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When these penguins escaped from the Washington Zoo, they led pursuers on a merry chase until they were captured in the Potomac River.

why prize uniformity?

Dictionaries define uniform as "being the same or alike." The ferro-alloy consumer who works with steel ingredients will tell you uniformity is mighty important.

The Philo and Rainier brand seals of the Ohio Ferro-Alloys Corporation are your guarantee of uniformity in the agents used for deoxidizing, alloying and degasifying metal.

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Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

A MODERN JOBBING FOUNDRY *Saves with* STROMAN FURNACES

The Nelson Foundry Company, in Morton Grove, Illinois, a prominent jobbing foundry, melt their metals, to cast the various products they make, in Stroman Stationary Crucible Furnaces and an Economelt. They find the melting is faster, metal condition better, fuel costs lower and working conditions ideal since they have changed to Stroman Furnaces.

Stroman Economelt Furnaces are of the Direct Fired Reverberatory Type. Designed for Brass, Copper, Nickel, Gray Iron, Aluminum, and other alloys, they have no peer for efficient and economical melting. They are built in sizes to handle from 400 to 2500 lbs. Their unique design which preheats metal before it reaches the molten bath makes for greatest fuel economy as well as speed of melting. Maintenance is always at a minimum. The Economelt tilts pneumatically and can be supplied with Stationary Lip Pour too, using hydraulic tilting. Oil, gas or combination oil-gas fire. All in all they are the finest furnaces available and are sure money makers in any foundry, die casting or permanent mold plant.

Stroman Stationary Crucible Furnaces, which in Bill Nelson's foundry are used as auxiliary furnaces do their job very efficiently. Built in sizes from No. 20 to No. 400 crucible and fired by oil, gas, or combination, their fuel economy and sturdy construction make them a lasting investment that pays off in profits.

Learn about the many advantages and savings that come with Stroman Furnaces . . . and remember Stroman makes the furnace that is the answer to your melting problem. Write today . . . Their engineers will gladly consult with you at your convenience.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

THIS IS THE ◂COR-BLO▸

MODEL "D"

A DUPLEX MACHINE FOR BLOWING LONG SLENDER CORES.

Both heads blow together. The machine is arranged for automatic filling of sand tubes and automatic vibration of core box for drawing. Illustration at right shows front view.

★

Close-up view shows machine adapted to blowing radiator cores. This core box is 8"x36". Machine blows, vents and books the cores.

MAKE A NOTE RIGHT NOW TO **WRITE FOR CIRCULAR**

MACHINES AVAILABLE

MODEL "B"	*Hand Operated*
MODEL "C"	*Automatic*
MODEL "D"	*Duplex Automatic*

HARRISON MACHINE CO.

Designers and Builders of Machinery

P. O. Box 67 **Wesleyville, Pa.**

HERE'S HOW...

LINDBERG-Fisher 2-CHAMBER MELTING FURNACE

BEATS THE HEAT OF SUMMER

—reduces temperature 17°F. at operator's station

A well known Chicago manufacturer of aluminum and zinc die cast products beat the heat by installing this 40 KW Lindberg-Fisher 2-Chamber Induction Furnace for melting aluminum. Temperatures measured at the operator's station (3 feet from furnace) show:

Before*	After*
FUEL FIRED FURNACE	2-CHAMBER INDUCTION FURNACE
115°F.	98°F.

*Outdoor temperature 90°F.

The Chief Engineer says: "Working conditions for our operators have been greatly improved because of lower temperature in the immediate area of the furnace. Furnace shell is so cool that you can touch it with bare hands. We also find that molten metal is noticeably cleaner and, dross loss is considerably reduced."

Lindberg-Fisher Advantages:

COOLER OPERATION—Induction heating heats only the metal, not the entire furnace. No flame,—no products of combustion. Only comparatively small area of molten aluminum is exposed to operator.

CONTINUOUS LADLING—2-Chamber design allows cold metal to be added to charging chamber—does not affect temperature of ladling chamber within operating limits of the furnace.

ACCURATE TEMPERATURE CONTROL—Electronically controlled temperature equipment reduces scrap loss—allows lower maximum temperatures—eliminates over shooting and under shooting.

CLEANER MOLTEN METAL—Residue and impurities remain in charging chamber—only clean, residue-free metal passes to ladling chamber.

Ask for Bulletin 510 "Lindberg-Fisher 2-Chamber Induction Furnaces for Melting and Holding"

Fisher Furnaces

A DIVISION OF LINDBERG ENGINEERING CO.

2453 West Hubbard Street, Chicago 12, Illinois

Molder

Might

Imagine an America without fine motor cars — streamlined trains — giant planes! Imagine an American way of life where ordinary conveniences like refrigerators, ranges and radios would be rare luxuries. Such would be our life were it not for you, the foundryman. The sinews of America's strength are formed of your fibres. You've a right to be proud of your job which is contributing so much to our welfare and well-being!

THIEM

Thiem Products, Inc. takes pride in serving you and your industry. Through its laboratory-controlled core-washes and mold-coatings, Thiem offers products that are unquestioned in quality, unmatched in utility. Through scientific research and development, Thiem constantly seeks new products and new ways to further your progress.

Thiem

PRODUCTS, INC., MILWAUKEE 14, WISCONSIN

Manufacturers of Foundry Products Exclusively

KROME KOTE • FERRO KOTE • MOLD LITE • INGOT KOTE • NODRI MOLD SPRAY • FERRO-GLAZE FLUX • CHILL KOTE • SYNOL • CORE BINDERS

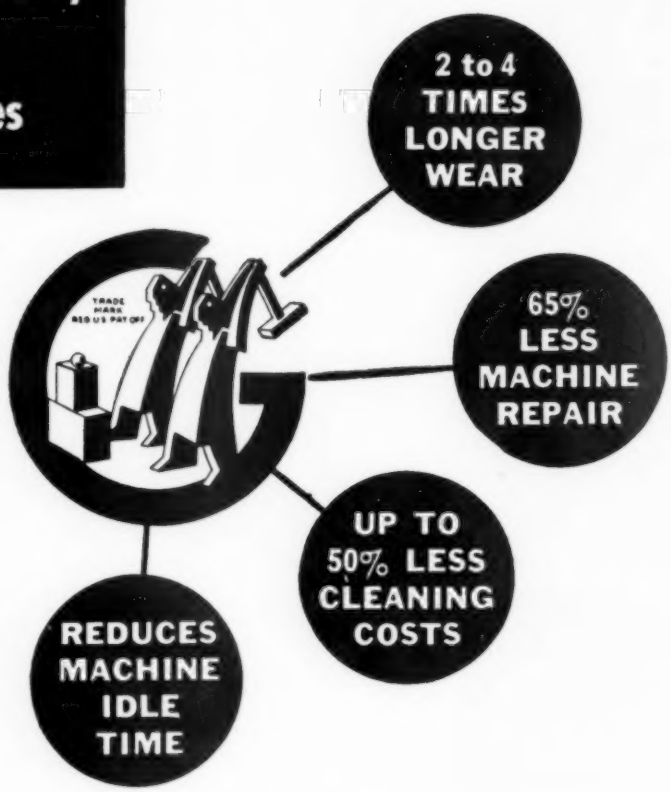
Visit us in St. Louis — May 2 - 5. American Foundrymen's Society 53rd Annual Convention. Headquarters — De Soto Hotel.

PATENTED

Malleabrasive

GIVES YOU

Matches the Potential Efficiency of Modern Airless Blast Cleaning Machines



Malleabrasive enables you to realize bigger returns on your investment in your airless blast cleaning equipment because it enables you to obtain the high-speed, big-production cleaning which such equipment is intended to provide.

Why limit the usefulness and productive capacity of your modern cleaning units by using ordinary abrasive or chilled iron shot and grit when MALLEABRASIVE can increase your output of cleaned castings, reduce your maintenance and parts replacement costs, lower your abrasive consumption?

The Only Blast Cleaning Abrasive of Its Kind!

Malleabrasive is produced under patent by the exclusive Malleabrasive process and is not to be confused with ordinary shot and grit described "Heat-treated" or "annealed," or by trade names connoting such treatments. The performance of Malleabrasive in rendering over-all savings in blast cleaning costs as compared with chilled iron shot—regardless of how such material is described—*is guaranteed* when comparative test runs are properly conducted.

Malleabrasive Savings Proven. You don't have to accept mere claims for Malleabrasive savings; they are proven by performance and actual records from many plants. Over 300 plants now using it. The use of thousands of tons over the past nine years has proven its merits.

Prove Savings for Yourself. Whether you clean grey iron, malleable or steel castings, Malleabrasive will show definite savings for you in airless blasting equipment. Our blast cleaning engineers will show you the way.

GLOBE STEEL ABRASIVE CO.

MANSFIELD, OHIO

LASTS LONGER • INCREASES PRODUCTION OF CLEANED CASTINGS

APEX Aluminum ALLOYS

Research leadership back of every Ingot

Custom-tailored alloys to meet your most rigid casting requirements. Apex laboratory-controlled alloys are clean, grain-refined and uniform in composition. "Proved best in every test from ingot to casting." Alloy booklet available upon request.

Apex Smelting Company

Chicago • Cleveland

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6700 GRANT AVENUE • CLEVELAND 5, OHIO

Field metallurgists are available for your foundry problems, casting engineering and alloy selection.

FOR FASTER PRODUCTION OF...

Better, Cleaner Castings

STEEL, MALLEABLE, GREY IRON, NON-FERROUS USE...

DELTA CORE & MOLD WASHES

Three easy-to-understand reasons why more foundries use DELTA Core and Mold Washes . . .

1. MORE PERFECT CASTINGS . . . 2. LOWER CLEANING ROOM COSTS . . .

3. LESS SCRAP IN MACHINING.

HERE'S WHY...

a. Delta Core and Mold Washes "Anchor" themselves by penetrating from 3 to 5 grains deep into the sand. This bond between the wash and the sand . . . a distinctive DELTA characteristic . . . produces an expansion-resisting coating essential to the production of finer finished castings.

b. The hot strength of Delta Core and Mold Washes increases with each degree of temperature rise from 1800°F to 3000°F providing maximum critical hot strength for all foundry applications.
The higher hot strength of DELTA Core and Mold Washes eliminates surface sand fissuring, excessive sand expansion and distortion.

c. No gas leakage through Delta Core and Mold washed surfaces. Gases produced by decomposition of organic binders in the core sand cannot leak through Delta Core and Mold washed surfaces to contact the molten metal. Only Delta Core and Mold Washes provide this unique and all-important insurance against defective castings resulting from core gas leakage. DELTA Core and Mold Washes insure more perfect castings with finer finished surfaces.

DELTA CORE & MOLD WASH-BASE
Mix with silica flour and water to produce finished wash.

•

FOR STEEL
STEELKOAT — Special Core and Mold Wash.

•

FOR GREY IRON & MALLEABLE
Grakoat — Blackoat — Hi-temp.

•

FOR NON-FERROUS METALS
Non-FerrusKoat.

•

FOR ALL SAND CAST METALS
THERMOKOAT — It's Plasti-Lastic.
PYROKOAT-Hi-Speed.

•

FOR UNUSUALLY HIGH TEMPERATURE CONDITIONS
Z-KOAT-High-fusion-temp wash.

•

• *Ask for a liberal working sample.*

There is no "just as good" substitute for any DELTA Core and Mold Wash just as there is no substitute for DELTA'S scientific laboratory control of production which safeguards the quality and uniformity of all DELTA Foundry Products. DELTA Research laboratories developed, and pioneered the use of, Plastic-type Core and Mold Washes . . . and still leads the field in the development of new products for improved foundry practices.

DELTA OIL PRODUCTS CO.

MILWAUKEE 9, WISCONSIN

SNAPPY ACTOR ...RAMS CORES FASTER

THIS new Rotor No. 22-B Sand Rammer in this foundry is blasting costs because it hard-packs core sand much faster than previous rammers. Its blows are fast and snappy.

Have you investigated the new Rotor Rammers for your work? There's a type for every job . . . light or heavy duty . . . bench or floor model. Write for a free copy of Bulletin No. 32.

AIR O'TOOL

THE ROTOR TOOL CO.

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

For Increased Better Working

Mechanize with

PROVED ALLIS-CHALMERS FOUNDRY, POWER AND ELECTRICAL EQUIPMENT

Bonus production is possible in your foundry with modern Allis-Chalmers equipment used in connection with melting and casting, sand conditioning and reclamation, and a complete line of heavy-duty *Foundromatic* shakeouts. All this equipment has been designed to increase efficiency. Allis-Chalmers engineers cooperate with foundry engineering firms not only in making the foundry more productive, but also a clean, healthful and safe place to work.

In addition, *coordinated* performance is possible as Allis-Chalmers also manufactures a complete line of motors, drives and controls — plus electric generation and distribution equipment.

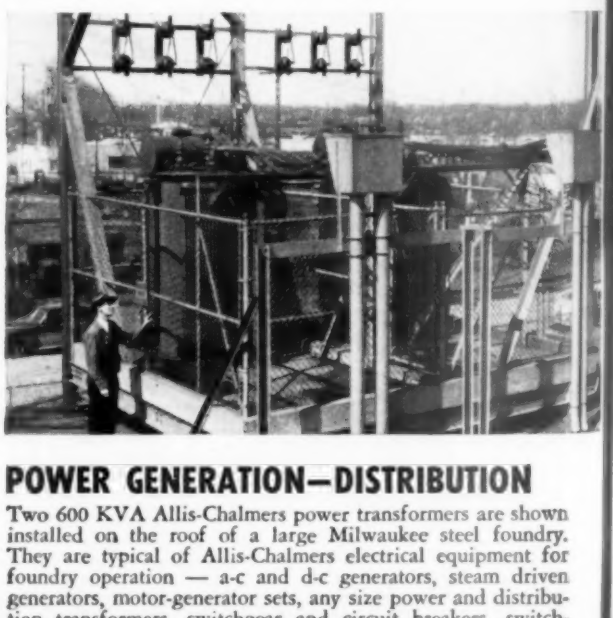
Thoroughly tested in Allis-Chalmers own foundries and others around the world, A-C equipment provides mechanization necessary for castings of low cost and high quality. Contact your nearest Allis-Chalmers office or write for Bulletin 25B6092B, describing the complete Allis-Chalmers foundry line.

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE, WIS.

A 2673

SAND CONDITIONING

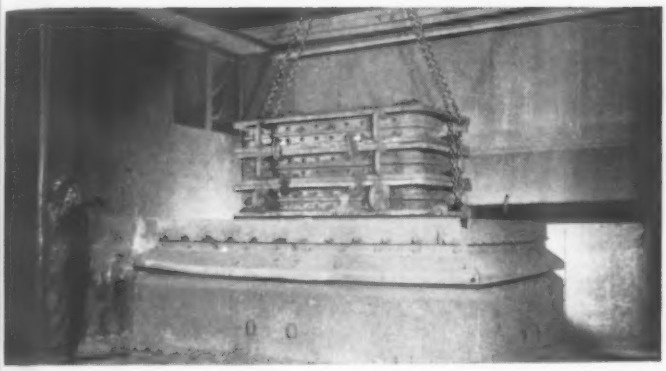
Up to 60 tons of broken core sand goes over this *Low Head* vibrating screen daily in a large Midwestern steel foundry. Allis-Chalmers builds three basic types of screens for foundries: including inclined and horizontal designs for wet and dry screening, aerating sand after mulling, screening shakeout sand, removal of refuse from new sand. High tensile steel alloy construction gives up to 50% more strength, reduces unit weight and cuts power requirements.



POWER GENERATION—DISTRIBUTION

Two 600 KVA Allis-Chalmers power transformers are shown installed on the roof of a large Milwaukee steel foundry. They are typical of Allis-Chalmers electrical equipment for foundry operation — a-c and d-c generators, steam driven generators, motor-generator sets, any size power and distribution transformers, switchgear and circuit breakers, switchboards and voltage regulators. Allis-Chalmers equipment meets all the requirements for industrial protective service.

Output... Conditions...

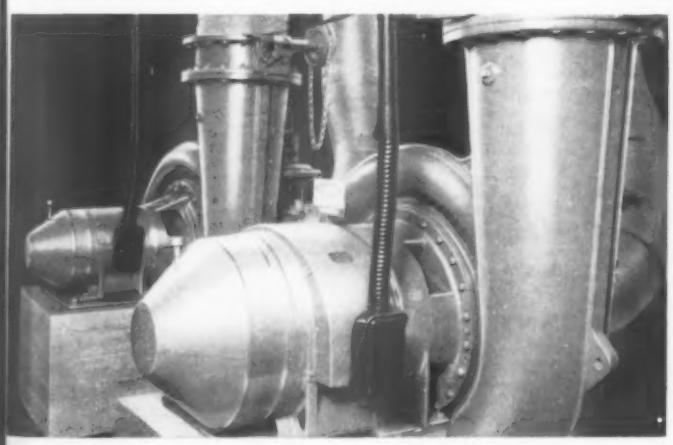


"FOUNDROMATIC" SHAKEOUTS

Less than two minutes are required to shake out 25-ton flasks on an 8′ x 10′ *Foundromatic* shakeout. These heavy-duty shakeouts handle a wide range of flask sizes and shapes. Flask breakage is kept to a minimum as the load is evenly distributed over the deck. Offered in single units for stationary and portable types in sizes from 4′ x 6′ to 8′ x 10′. Capacities from 8,000 to 50,000 lbs. Higher capacities and deck areas can be obtained with multiple deck shakeouts.

MOTORS—DRIVES—CONTROLS

Allis-Chalmers builds motors and controls for foundry applications requiring more than 1 hp: including a-c and d-c . . . open, protected and enclosed types. *Texrope* V-belt drives do not slip or jerk, are easy to install and safeguard. They are sold in matched sets, engineered to cut power transmission losses. They save space and provide flexibility of layout. When variable speed is necessary, *Vari-pitch* drives provide speed changes from 15 to 25% per sheave.



CUPOLA BLOWERS

It pays to specify Allis-Chalmers blowers for your cupolas. Compact, simple in construction and extremely reliable, they have only one moving part, the impeller, which is usually "overhung" on the motor shaft . . . supported by the motor bearings. Cast casings result in a unit of rigid construction, deaden machine noises and eliminate vibration. Hundreds of A-C cupola blowers have been installed in foundries around the world.

INDUCTION MELTING

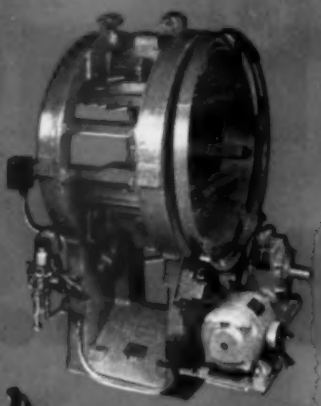
Excessive burning off of alloying metals is avoided through use of Allis-Chalmers mercury arc frequency changing equipment for induction melting. Lines of flux passing through the melt create a positive stirring action, making puddling unnecessary. Clean induction heat improves foundry working conditions . . . promotes good will among the workers. Induction melting furnaces are available in several sizes for both ferrous and non-ferrous melting applications.

Foundromatic, Low Head, Texrope and *Vari-pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Pioneers in Power and Electrical Equipment — Biggest of All in Range of Industrial Products



International Roll Over type REP Machine—complete with air clamps and 1 HP Newell motor. Capacity—24" x 28", 12" high. Gear speed reducer 40-1 ratio.

International Type J Air Jarring Machine—5" Jolt cylinders and air-controlled roll off. Table size 24 x 28".

Announcing

NEW FACILITIES AND IMPROVED HANDLING METHODS FOR

Rebuilding Machines

We're now in a new home—equipped to the last word for rebuilding all kinds of machines—especially foundry machinery.

Our expanded facilities now offer you a complete service, embracing a top-notch engineering department, a highly skilled pattern shop, and a fully equipped machine shop.

And when your machines are brought in for rebuilding, they are lifted off the truck inside the building and placed where required by special heavy crane. This means quick handling with minimum man power—a great advantage to you.

If you have a machine that needs rebuilding, we are sure we can save you much money in restoring it to its original operating condition.

An opportunity to buy these Rebuilt Foundry Machines at much below cost

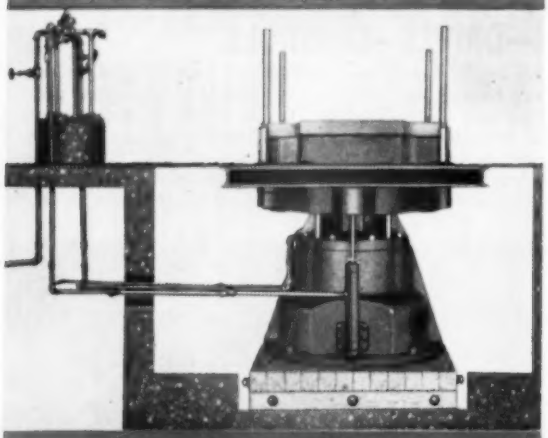
Shown here are a few of the many foundry machines we have ready for immediate shipment. Some have been rebuilt but all have been thoroughly checked for perfect operation and are offered with 90-day guarantee. You obtain a machine that will equal the performance of a new one—yet cost you just a fraction of the original price.

Wire, phone or write for more complete information.

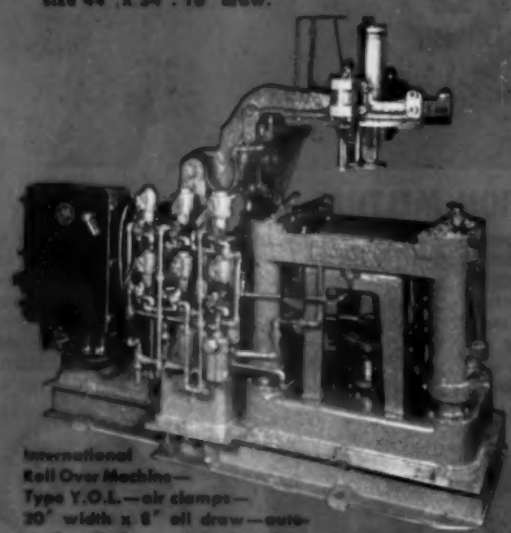
Standard Pattern Works

MACHINE DIVISION

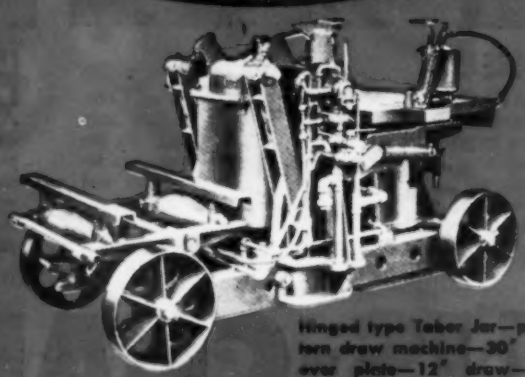
13781 CONCORD AVENUE • DETROIT 12, MICH.



Davenport Jolt Stripper Pin-lift. Model AJS. New. Capacity 4000 lbs. at 80 lbs. air. Table size 44", x 54". 16" draw.



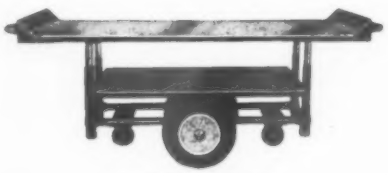
International Roll Over Machine—Type Y.O.L.—air clamps—20" width x 8" oil draw—automatic cylinder control—3-station switch.



Hinged type Taber Jar—power pattern draw machine—30" x 40" roll over plate—12" draw—1000 lb. capacity—with air-operated flask clamps.

MODEL A-27, shown here in use in a large electrical manufacturing plant, is ideal for carrying the heaviest loads. Heavy duty elliptical springs and inner coil springs in the upright supports, quickly absorb shocks and bumps. Timken roller bearing disc wheels with pneumatic tires. Three sizes: 27″ x 60″, 800 lbs capacity; 27″ x 72″, 1,000 lbs capacity; and 27″ x 84″, 1,200 lbs capacity.

Cores Ride with *"Feather-Bed"* Ease ON CMD PNEUMATIC CORE TRUCKS



MODEL D-1

This moderately-priced truck features an auxiliary loading tray for extra convenience. Both loading trays are heavy sheet steel. CMD inner coil springs and pneumatic tire wheels make Model D-1 a real value. Load capacity is 500 lbs.

Reduce core damage costs as much as 50 to 75 per cent by transporting cores on shockproof CMD Pneumatic Core Trucks. These trucks, with their exclusive inner coil spring construction in the upright supports, and their pneumatic tires, absorb all bumps and jars *before* they reach the cores and cause chafing or breaking. Since 1925, foundries have relied on CMD Core Trucks for fast, safe handling and delivering of cores from the core room to the foundry.

Write today for FREE circular on CMD Core Trucks and other foundry specialties.

CHICAGO MANUFACTURING & DISTRIBUTING CO.

Dept. 4F, 1928 West 46th Street **Chicago 9, Illinois**

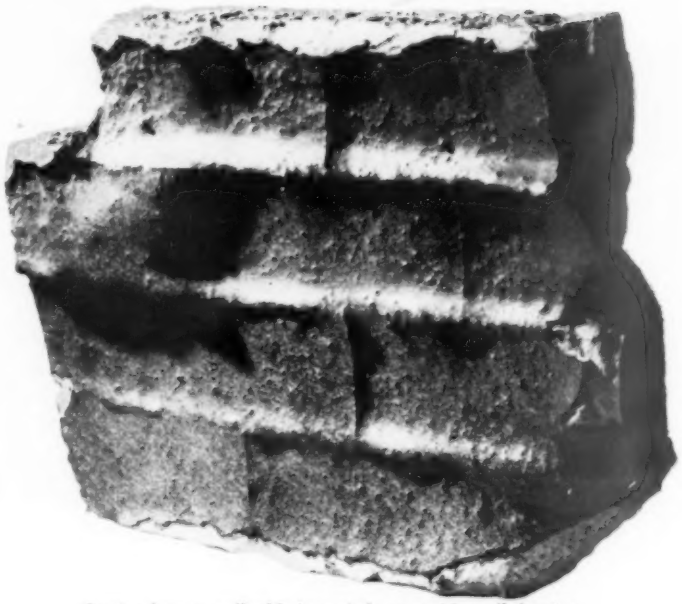
Now • an A. P. GREEN Slag-Resisting Mortar

Developed Especially for the Foundry Industry

SATANITE

SATANITE has been developed for laying firebrick in all types of furnaces and ladles in which molten iron or steel, or slag, is in contact with the brick and joint erosion is unusually severe. In this service, SATANITE retards erosion—joints actually protrude ⅛ to ¼ inch beyond the surface of the brick after the brick have been worn back several inches.

In malleable air furnaces where side walls and bottom are laid up with SATANITE, any part of them can be easily removed for patching or rebuilding. SATANITE's long service life in joints gives additional protection to side wall and bottom brick.



Section from a malleable iron air furnace side wall showing protrusion of SATANITE joints after firebrick had worn back several inches.

Use SATANITE bonding mortar to increase the life of the lining in all types of malleable iron air furnaces, ladles, electric furnaces, cupolas and hot metal mixers. Packed in 100-pound moisture-proof multi-wall bags.

A. P. Green REFRACTORY PRODUCTS

Look for the name of your nearby A. P. Green distributor in the yellow pages of your telephone directory or write us for more information.

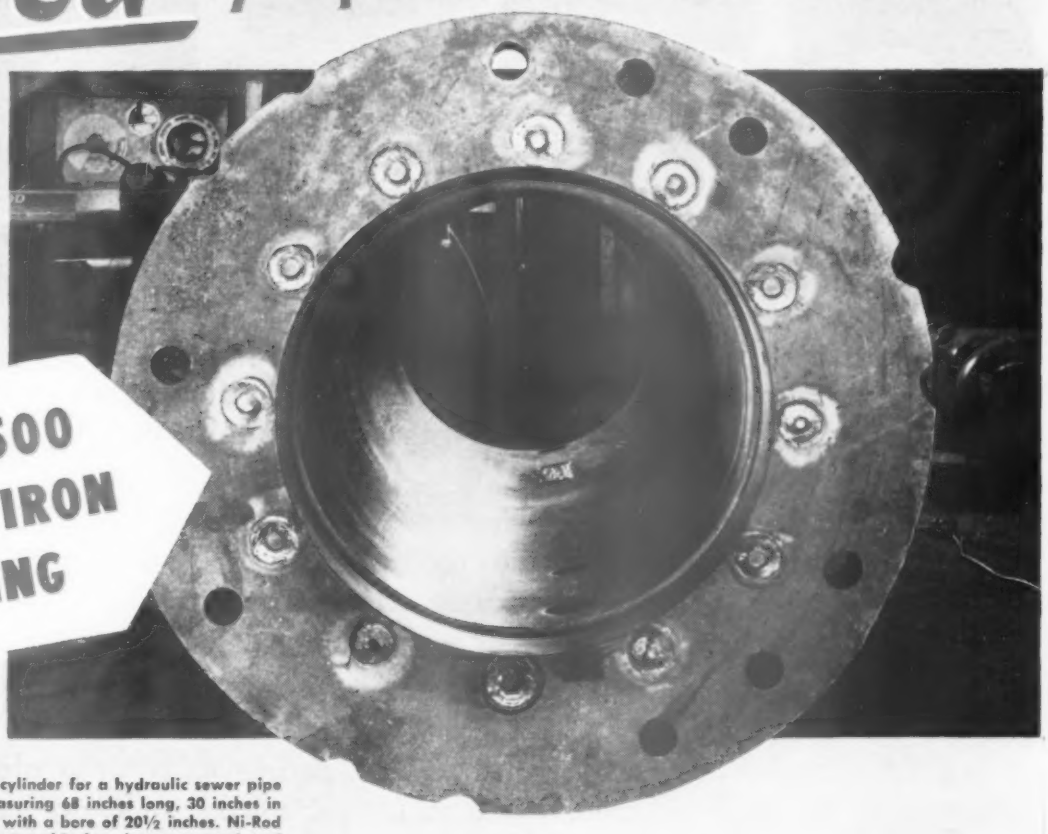
A. P. GREEN FIRE BRICK COMPANY

MEXICO, MISSOURI, U. S. A.

A. P. GREEN FIRE BRICK CO., LTD. IN CANADA

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE WORLD

Saved by 5 pounds of NI·ROD...



THIS 2500 POUND IRON CASTING

Cast iron cylinder for a hydraulic sewer pipe press, measuring 68 inches long, 30 inches in diameter, with a bore of 20½ inches. Ni-Rod was used to weld plugs into unwanted stud holes, and fill a mislocated oil groove.

Here is a case where a small dose of Ni-Rod* cured a large technical headache.

When it was discovered that a relatively slight machining error had ruined an expensive 2500 pound casting, technicians of a West Coast machine company were dismayed.

The casting was to be used in a hydraulic press for forming sewer pipes. The mere matter of a mislocated oil groove—measuring only 7 inches long, 2 inches wide, and 1 inch deep—had rendered the cylinder useless for its intended purpose.

Remedies of all kinds were suggested but were regretfully discarded as impractical. When hope of saving the casting by ordinary means had faded, specialists of the Pacific Metals Company, Ltd., Los Angeles, were called in. They were immediately optimistic. They suggested welding with Ni-Rod.

Work was started at once. Welders carefully filled the misplaced oil groove with Ni-Rod. At the same time, still another alteration was attempted. 12 unwanted stud holes were blocked up by welding in cast iron plugs.

When the final remachining was complete, it proved almost impossible to tell where the welding had been done. The repair was successful in every respect, and spirits soared at the machine company's plant. With 5 pounds of Ni-Rod, costing only $7.50, they had saved a 2500 pound casting that had cost $1,000!

Reports such as this—reports of Ni-Rod's superior performance—are coming in from all parts of the nation. Shops everywhere are turning to Ni-Rod for better welds in cast iron, and dependable welds of cast iron to steel. If welding plays a part in your production or maintenance operations, find out more about Ni-Rod without delay. Send for your copy of "For Machinable Welds in Cast Iron."

*Reg. U. S. Pat. Off.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

EMBLEM OF SERVICE
INCO NI-ROD
TRADE MARK

GET NI-ROD FROM:

Whitehead Metal Products Company, Inc.
Steel Sales Corp. — Williams and Company
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Eagle Metals Co. — Metal Goods Corporation
Robert W. Bartram, Ltd. — Alloy Metal Sales, Ltd.
Wilkinson Company, Ltd. — Metal & Thermit Corporation
Hollup Corporation — National Cylinder Gas Company

STERL

WHERE GIANT PRESSES PLUS HOLD WHEEL TOLERANCE TO

Conforming to strict standards of excellence is everyday procedure at Sterling. It is one of many features of Sterling's New Research and Development Program that is resulting in superior, long-lived grinding wheels to do your jobs better and much faster.

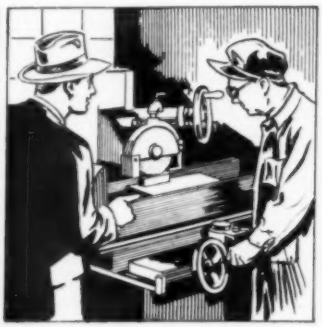
Production-minded engineers are ready to apply all the functions of our unusual research technique to making, whenever necessary, special wheels for your jobs----building them to snap up your production at a real, profit-building pace! This is being done in large and small industries everywhere....and can be accomplished in yours! We'll provide quick delivery, too!

Try Sterling's "Wheels of Industry" made to a new plan, backed up by the most up-to-date creative and manufacturing program available anywhere. Upon request, we'll explain its many features. You'll like them!

Sterling Research and Development In Action

FIRST STEP When necessary, the Sterling engineer will recommend a new wheel, built to your specific job demands.

SECOND STEP . . . He will examine your grinding set-up and suggest necessary changes He may ask you for a sample of the job's alloy.



THIRD STEP In our laboratory, your alloy sample will undergo many tests. Your resulting wheel will be approved by five technicians.

FOURTH STEP Your special wheel is certain to do a quicker, more efficient job - - the natural result of Sterling's careful planning.

THE STERLING GRINDING WHEEL DIVISION

of

THE CLEVELAND QUARRIES CO.

TIFFIN, OHIO

Since 1885, Manufacturers of "The Wheels of Industry"

Branches: Boston, Chicago, Cleveland, Detroit, Los Angeles, Philadelphia, New York. Distributors In All Cities.

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TECHNICAL SKILL
MERE THOUSANDTHS

These Sterling folders are now available. Send for yours today.

AN EXAMPLE of STERLING'S DEVELOPMENT TECHNIQUE

JUST the right bond and grain combination, subjected to tons of pressure, comes out as a structurally perfect wheel, accurate to thousandths of an inch, and ready for further processing.

Handles Production Jobs With The Ease Of A GIANT!

● You can rely on

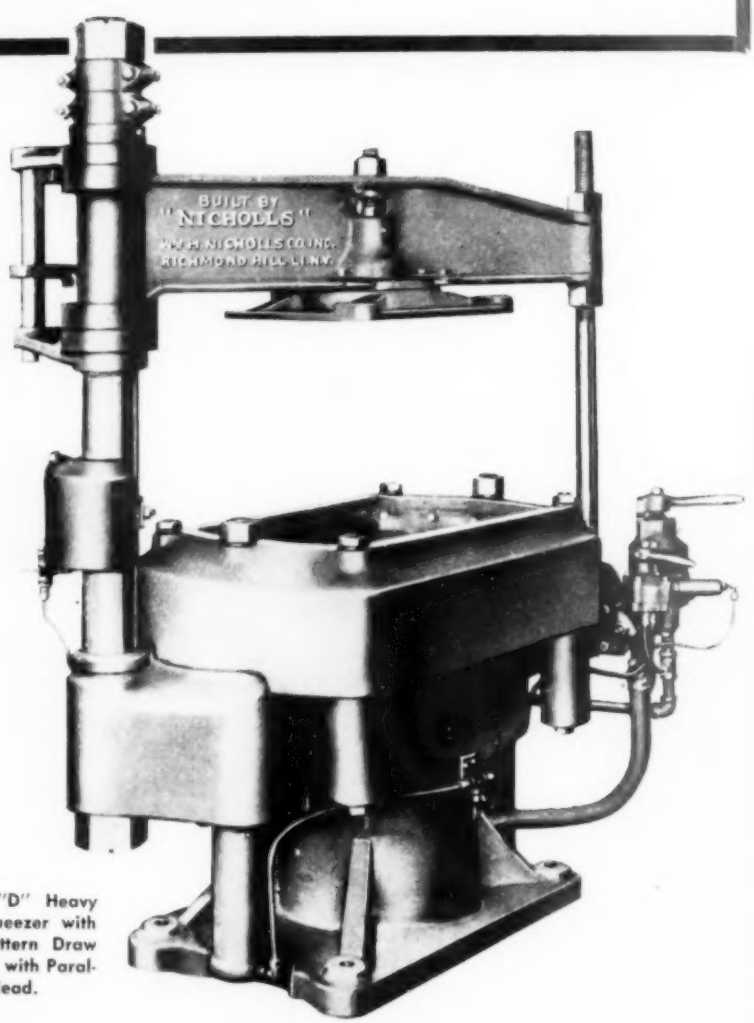
NICHOLLS

MOLDING

MACHINES

to withstand the pressure of continuous operation and consistently produce the maximum number of good molds. These Mechanical Giants have been meeting production schedules on time for the past thirty-eight years.

● Why not investigate the complete Nicholls line of stationary and portable types for the production of light, medium and heavy castings?



11-32 Type "D" Heavy Duty Jolt Squeezer with Pneumatic Pattern Draw and equipped with Parallel Squeeze Head.

Wm. H. NICHOLLS Co., Inc. RICHMOND HILL 18, LONG ISLAND, NEW YORK

ESTABLISHED 1910

FOREIGN MANUFACTURERS AND SELLING AGENTS FOR CONTINENTAL EUROPE AND GREAT BRITAIN — GEORGE FISCHER, LTD., SCHAFFHAUSEN, SWITZERLAND

NICHOLLS

Increase in technical personnel has accompanied the opening of the new electric furnace plant of our wholly owned subsidiary, Electro Refractories & Alloys Canada Ltd., at Cap-de-la-Madeleine, Quebec. Our capacity to co-operate in the solution of individual problems is almost unlimited as to engineering and chemical techniques in our fields.

Grant S. Diamond

GRANT S. DIAMOND, President

Electro

If You Have An Individual Problem, Tell Us About It

"Yes, but who can we get to make it?" That question often comes up after chemists and engineers have originated something new to meet individual needs. Electro follows through from theories to products and practices. For example: An industrialist required iron-free aluminum. We made it possible with a special Electro Bowl Type Tercod Crucible. A grinder of intricate shapes had to eliminate the hazard of breaking wheels. We increased the safety margin and producing capacity with special Electro High Speed Abrasive Wheels. These indicate our capacity to be of special service to you; and we invite, without obligation, submission of any problem within our field of operation. See details below.

Electro SINCE 1919

Electro SERVES THESE INDUSTRIES WITH THESE Electro PRODUCTS

METAL—Non-Ferrous and Ferrous Foundries: Steel Mills and Smelters: Brass Rolling Mills: Heat Treaters and Annealers.

CERAMIC—Potteries: Art Potteries: Manufacturers of Grinding Wheels: Sanitary Ware: Floor and Wall Tile: Electrical Porcelains: Miscellaneous Ceramic and Enamel Plants.

AUTOMOTIVE—Foundry, foundry cleaning, abrasive cutting-off, heat treating, tool room and precision grinding and finishing departments.

CHEMICAL—For applications where high temperatures or other severe operating conditions indicate the use of special refractories and cements.

SHIPBUILDING—Weld grinding, abrasive cutting-off, tool room and precision grinding, foundry, foundry cleaning, heat treating, power plant refractories.

PUBLIC UTILITIES • FEDERAL BUREAUS
STATE AGENCIES • MUNICIPAL DEPTS.

ABRASIVE WHEELS—Resin-bonded, High-Speed Grinding Wheels to cover nearly every conceivable use from snagging and cutting-off operations to fine precision grinding.

CRUCIBLES—(Tercod-Conqueror) Pedestal Blocks and Pot Lids—The Carbon-bonded Crucible for melting aluminum—nickel—copper—the brasses and bronzes—zinc—silver—gold—iron, using any fuel: oil, gas, coke or coal, electricity.

REFRACTORIES—Special Refractories—Electric furnace refractories of all kinds used for:

CERAMIC KILN FURNITURE—Slabs and Posts for rigid, floating or semi-floating open construction; plate setters, tile setters, sanitary ware setters and silicon carbide saggers.

MUFFLES AND HEARTHS—One piece and sectional for enameling furnaces, tunnel kilns, assay and heat treating furnaces, pottery kilns.

CRUCIBLE FURNACE FURNITURE—Linings, covers, insulation, burner blocks.

PYROMETER TUBES—And tubes for other purposes.

BRICK—9" series or special shapes to individual specifications.

BURNER BLOCKS—Electric furnace door blocks, door frames, port blocks and electrode sleeves.

STOPPER HEADS—For steel ladles; also slag hole and tap hole blocks for Cupolas.

CEMENTS—Cements and Ramming Compositions—Of special refractories used by all industries; monolithic linings for electric, gas and oil furnaces; patching furnace walls, laying brick, boiler setting and ladle linings.

ALLOYS—Special compositions for additions, deoxidation, degasification, purification: Copper—Aluminum—Chromium—Titanium—Nickel—Silicon—Magnesium—Iron—Lithium—Calcium—Calcium Boride—Tin—Zinc—Lead.

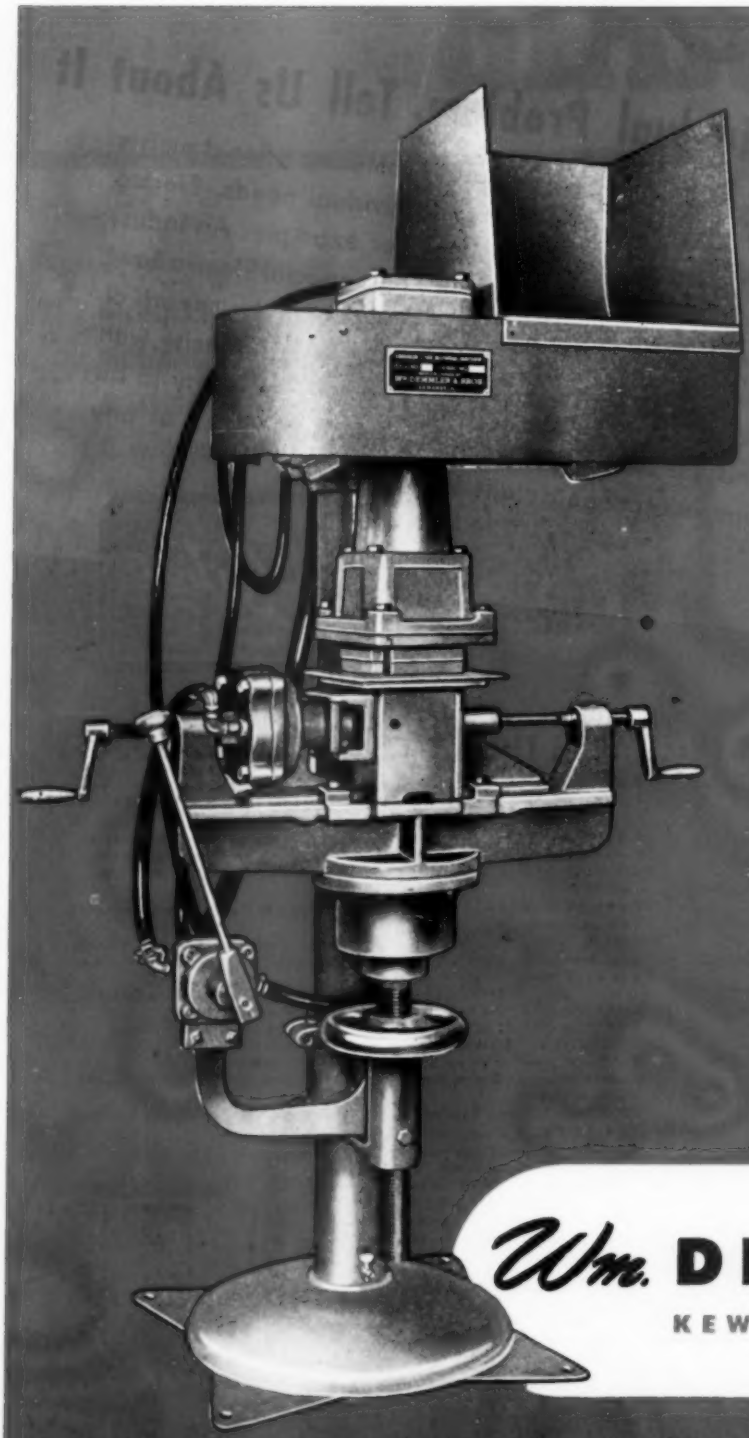
Electro Refractories & Alloys Corporation

West Coast Warehouse

344 DELAWARE AVE. LOS ANGELES BUFFALO 2, N. Y.

NO. 55 DEMMLER

CORE BLOWING MACHINE



IDEAL FOR FAST, ECONOMICAL PRODUCTION ON SHORT RUN JOBS

Short run jobs can be profitable, too!

The DEMMLER No. 55 is proving it every day . . . day after day in foundries everywhere. This small, rugged, efficient core blower is ideal for blowing cores weighing up to four pounds; was especially designed to fill the foundryman's need for just such work.

Sand magazine and carriage are aluminum castings, mounted on ball bearing rollers for utmost ease in pushing from filling to blowing position.

The DEMMLER No. 55 has *both* vertical and horizontal air operated core box clamps, controlled automatically by the same hand valve that blows the core.

This versatile machine will accommodate boxes 9 inches long, has sliding, quick change blow plates and features a trouble-free diaphragm type blow valve.

Sand magazine opening is 4½ by 9½ inches. Three different sand magazine sizes available.

Simple in construction . . . simple in operation, the DEMMLER No. 55 core blower is the economical solution—the profitable solution—to the rapid production of high quality small cores. Very reasonable in cost, the DEMMLER No. 55 is an extremely worthwhile addition to any foundry, large or small.

Illustrated specification sheet will be sent on request.

Wm. **DEMMLER** *& Bros.*

KEWANEE, ILLINOIS

Manufacturers of Core Blowing Equipment Exclusively Since 1911

"ELECTROMET" VANADIUM

Trade-Mark

FOR THE PRODUCTION OF FINE STEELS

VANADIUM GIVES STEEL . . .

- ★ HIGH STRENGTH
- ★ INCREASED DUCTILITY
- ★ GOOD WELDABILITY
- ★ ABRASION RESISTANCE
- ★ TOUGHNESS

Springs, axles, and other parts of the trucks of high-speed diesel locomotives are made of vanadium steel. Vanadium is also used in steel for tools and machinery parts because of the exceptional properties that it imparts.

Vanadium improves steel by increasing its yield strength and its ductility. Vanadium-bearing steels are tough—because of their uniformly fine grain size—and resist abrasion, fatigue, and impact. They are especially suitable for parts subject to high dynamic stress.

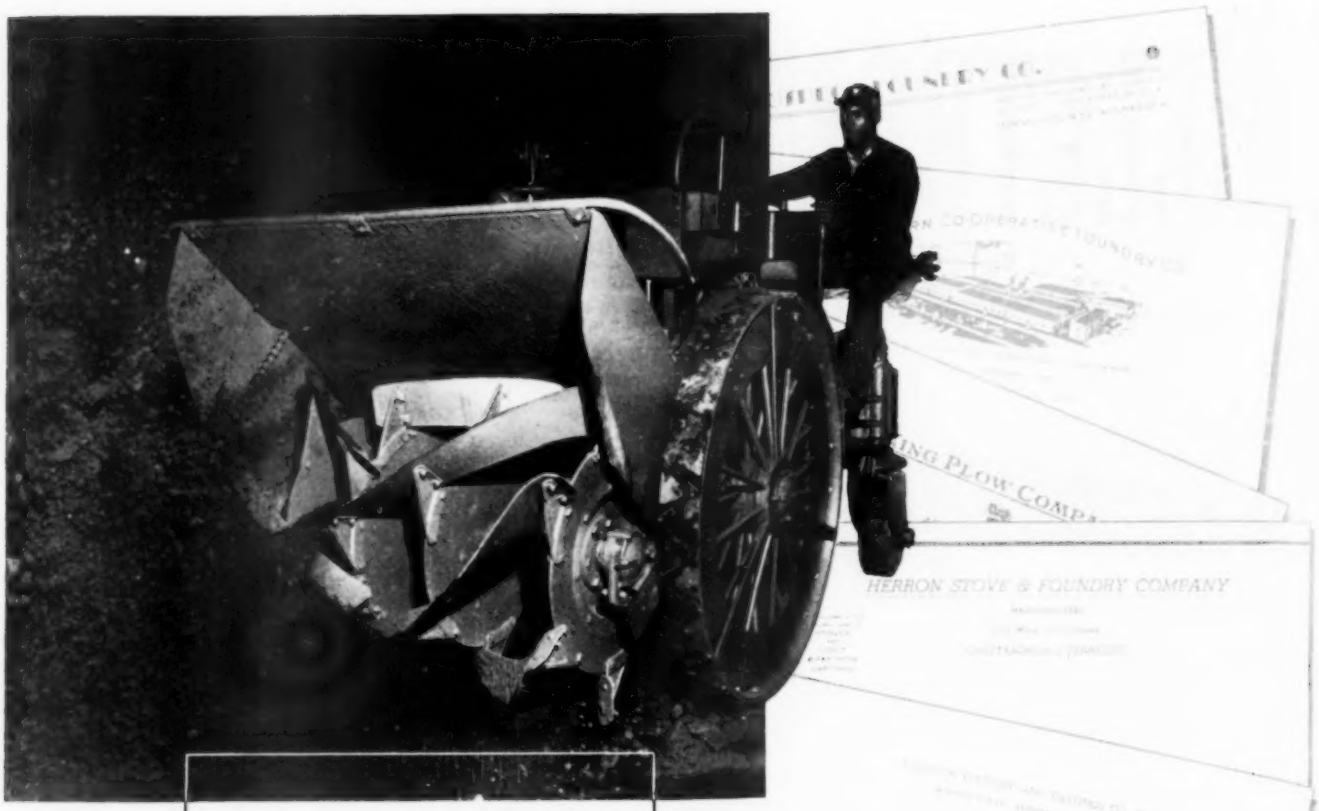
Vanadium steels are readily cast, forged, and rolled. They are also easily machined, and have exceptional weldability. When vanadium is added to steel in quantities ranging from 0.05 to 0.20%, heat-treatment is simplified. Its use results in a tough, strong, wear-resisting surface on case-carburized parts.

ELECTROMET ferrovanadium is made especially for the manufacture of fine steels for tools and machinery parts. This ELECTROMET alloy contains 50 to 55% vanadium and is available for immediate delivery in grades containing maximum 0.20%, 0.50%, or 3.00% carbon. It is furnished in various crushed sizes suitable for all open-hearth and electric-furnace additions.

Our staff of competent metallurgists is always ready to furnish on-the-job technical assistance in the use of vanadium and other ELECTROMET ferro-alloys and alloying metals. Write to the nearest ELECTROMET office.

ELECTRO METALLURGICAL DIVISION
Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
OFFICES: Birmingham • Chicago • Cleveland • Detroit
New York • Pittsburgh • San Francisco
In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Electromet
TRADE-MARK
Ferro-Alloys and Metals



"the SANDCUTTER has more than PAID FOR ITSELF"

There is one point on which all foundrymen agree: Any piece of equipment that will pay for itself QUICKLY . . . and then continue to provide substantial savings . . . is well worth its original cost. If letters from users are any indication, then the Sandcutter is a gilt-edge investment. Typical of the comments of Sandcutter users are the following excerpts from recent letters:

"We feel that we are saving approximately $45.00 each day and making it much easier for the men since installing the Sandcutter."

"The cost of the Sandcutter has more than paid for itself to date. Absenteeism was formerly a serious condition with the night crew, and now, since we have disposed of the "back breaking labor" of continuous shoveling, we have also disposed of our absentee problem."

"Before the purchase of the AM Sandcutter, we had a large crew of men cutting our sand by hand . . . . Now one man with the Sandcutter cuts all our sand including the facing which previously took two alone."

The Sandcutter reduces the cost of sand conditioning because it is faster and requires less labor to operate. There is no hand shoveling required. The Sandcutter moves up and down the molding floors, its whirling blades cutting through every heap again and again. There is no equaling the condition of the sand cut with a Sandcutter. Dry spots, wet spots, lumps and pockets of new sand cannot escape the churning, blending action of the cutting cylinder.

Add your name to the growing list of foundries that are increasing their profits through the use of Sandcutter. Write today.

Write for Complete Catalog

The "American Line" catalog illustrates and describes every Sandcutter model as well as all other American Products. Send for your free copy today.

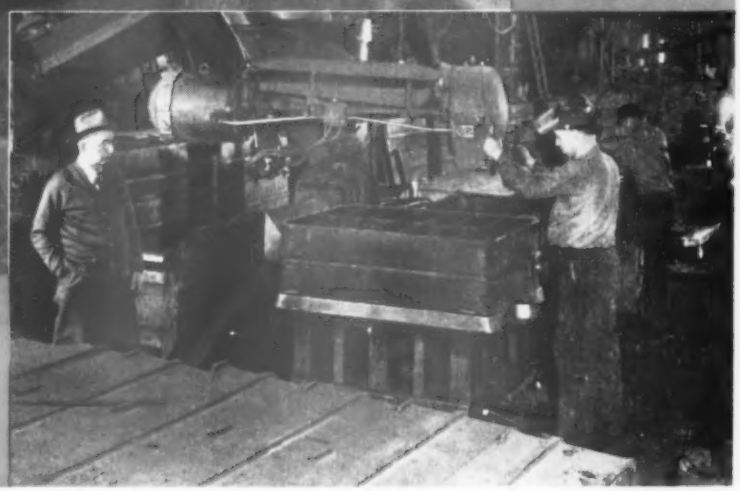
American Sandcutters

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 505 S. Byrkit St., Mishawaka 2, Ind.

OLD TIMERS ...Prefer Sterling

Group of Sterling Heavy-Duty Flasks at Standard Foundry Co., Racine, Wis.

Ed Goetz, Works Manager of Standard Foundry, Racine, Wisconsin, inspects a yard full of various sizes and types of Sterling Heavy-Duty Flasks.



Standard Foundry workmen prepare cylinder mold in Sterling Heavy-Duty Flask for pouring on conveyor line.

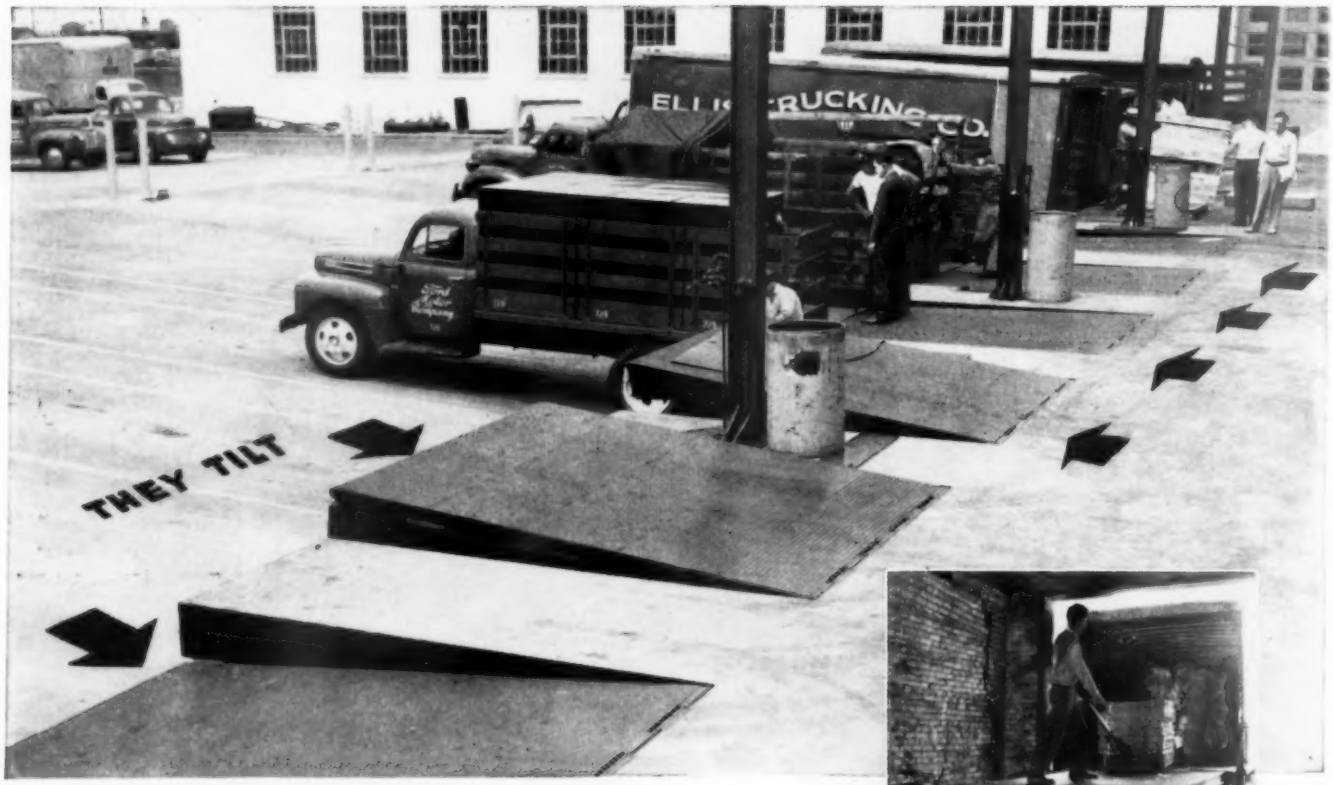
ED GOETZ USED ONE OF THE FIRST STERLING HEAVY-DUTY FLASKS . . . AND STILL USES STERLINGS TODAY

Here is another "old timer" who is a Sterling enthusiast . . . Ed Goetz, Works Manager of Standard Foundry, Racine. Ed has been a foundryman for 41 years, the entire period at Standard. He used one of the very first Sterling Heavy-Duty Flasks . . . continued to use them throughout the years . . . and is still using them today. Why? Because he found them more accurate, more rugged, and more economical for the big castings of cylinder heads and blocks poured at Standard. Yes, Sterling Steel Flasks are ideal for the tough jobs. They have these life-prolonging features: Special rolled steel channel construction . . . Center reinforcing rib . . . Square flanges . . . Full width bearing. They last longer, therefore, cost less. For complete information about Sterling Steel Flasks write for Catalog No. 59.

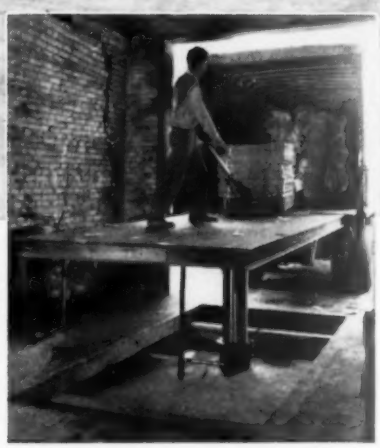
STERLING WHEELBARROW CO., Milwaukee 14, Wis., U.S.A.

A 5563-1P-C

"LOADING TIME CUT IN HALF"



Tilting Loading Dock Ramps Tilt to Meet Truck Body. Operated by Hydraulic Lifts.



Standard Wayne Platform Lift Itself Becomes Loading Dock.

Cut Costs

WITH WAYNE LOADING DOCK LIFTS

YOU CAN save time and money with Wayne Hydraulic Leveling Ramps to adjust the level of the loading dock to the truck height. Material on skids can be directly transported into the truck body over a level path. A variance of as much as 20 inches in the height of truck bodies may be instantly adjusted by merely turning a valve. Users say: "Cuts loading time in half." . . "As good as doubling dock facilities."

SEND FOR ILLUSTRATED FOLDER

Use the coupon below to get all the facts on this new plan to cut costs at the loading dock. No obligation.

THE WAYNE PUMP COMPANY, FORT WAYNE 4, INDIANA
523 Tecumseh Street

Please send folder on time-saving Wayne Loading Dock Lifts and give us some idea of the cost.

NAME _____

ADDRESS _____

CITY _____ STATE _____

for your protection

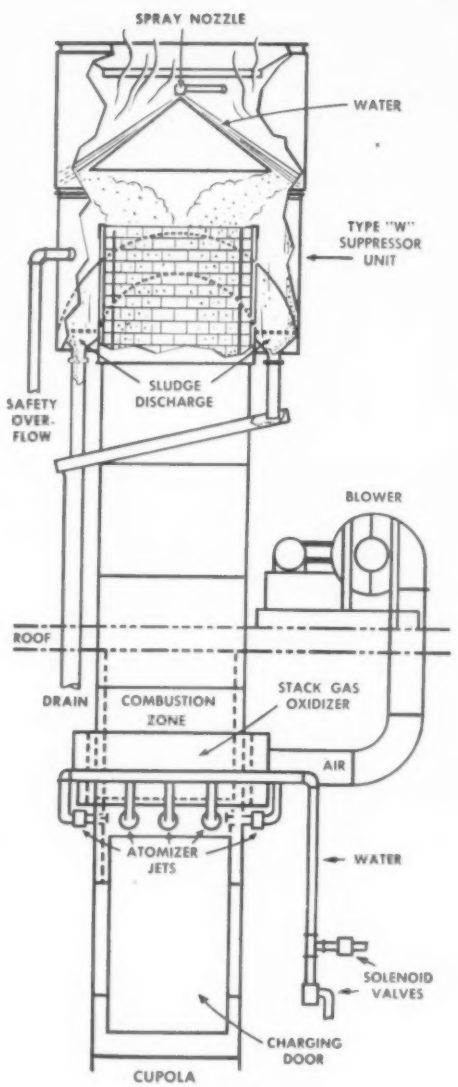
NATIONWIDE SERVICE

INDUSTRIAL AIR COMPRESSORS • HOSE REELS • BULK PUMPS • POWER WASHERS

Here is the

Cupola Dust and Spark Suppressor

you have waited for



Now it is easy to be a "good neighbor"—to eliminate the smoke, fly ash, and sparks from your cupola—to comply with rigid city ordinances. Whiting Hydro-Clone Type "W" Dust and Spark Suppressor is sturdy, compact, and simplified in design. It costs less to install, operate, and maintain.

Unburned particles, fly ash, cinders, iron oxide, etc., are effectively removed by a high-velocity, evenly distributed stream of water covering the area between the edge of the deflector cone and the outer shell.

The resulting slurry washes down the inner wall of the suppressor to twin discharge drains, and into a settling tank. Sludge may be removed manually, automatically, or drained into a wet slagging system. When treated to overcome acidity, the water may be recirculated.

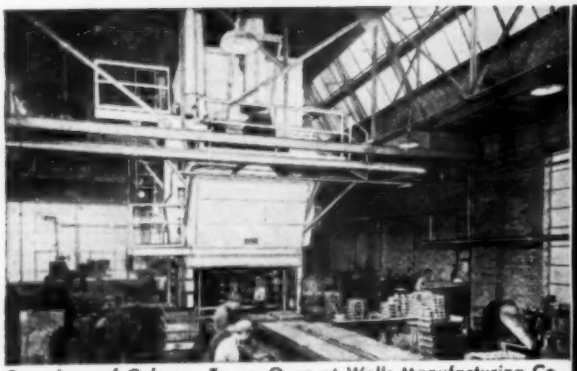
When the Stack Gas Oxidizer and Flame Suppressor Unit is applied, carbon monoxide and unburned carbon particles are burned, reducing the density and color of the smoke discharged into the atmosphere. By suppressing flames, temperatures are reduced and life expectancy of the Type "W" Suppressor is increased. Where flames are not excessive, the atomizer jets can sometimes be omitted, reducing the cost of the installation.

Bulletin FY-158 fully describes the new Type "W" Hydro-Clone. Write for your copy, today.

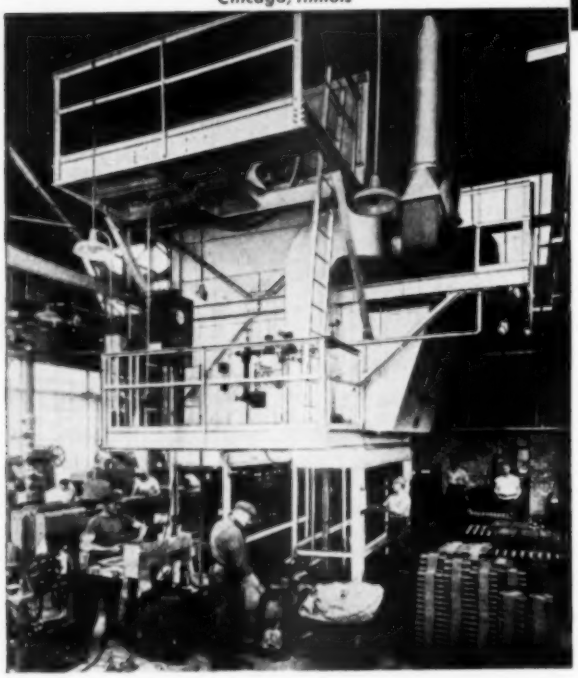
WHITING
CORPORATION

15607 Lathrop Ave., Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.



Two views of Coleman Tower Oven at Wells Manufacturing Co., Chicago, Illinois



COLEMAN

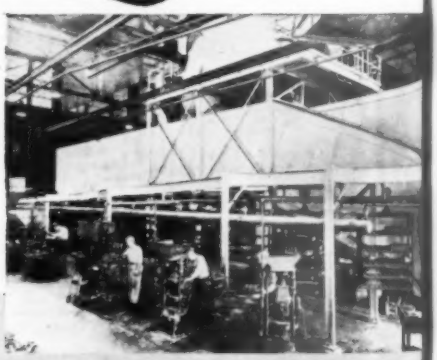
says H. W. JOHNSON... Wells Manufacturing Co.

"Our selection of a Coleman Tower Oven has proved to be a wise choice. Through its use our core-room is completely free from noxious fumes and smoke and gives our employees a highly desirable place to work. We find little trouble in getting men to work in this department which heretofore was extremely difficult.

"Easy accessibility to the oven trays from the core-blowers and core-benches has resulted in increased production. Also we find that the oven is capable of baking more cores per eight hour day than originally anticipated, thereby helping to increase overall foundry production."

A FEW REPRESENTATIVE COLEMAN TOWER OVEN OWNERS

Landers, Frary and Clark
Lynchburg Foundry Co.
Ferro Machine & Foundry Co.
Grede Foundries, Inc.
Westinghouse Electric Corp.
Ross-Meehan Foundries
Eastern Malleable Iron Co.
Scovill Manufacturing Co.
National Mall. & Steel Cast. Co.
Minn.-Moline Power Implem. Co.
H. C. Macaulay Foundry Co.
Singer Manufacturing Co.
Hamilton Foundry & Machine Co.
Lincoln Foundry Co.
Campbell, Wyant & Cannon Co.
Cincinnati Milling Machine Co.
American Steel Foundries
Ohio Steel Foundry Co.
Benton Harbor Mall. Ind.
Republic Brass Co.
Chicago Mall. Cast. Co.
Oberdorfer Foundries Inc.
Lake City Malleable Co.
Pontiac Motor Car Division
Wolverine Brass Works
Stockham Pipe Fittings Co.
Production Foundries Div. of Jackson Industries, Inc.



COLEMAN HORIZONTAL CORE OVENS
Overhead conveyor ovens specially designed for large scale production foundries in such fields as agricultural, automotive, etc.

COLEMAN HEATING SYSTEMS USE THE MOST ECONOMICAL FUEL AVAILABLE TO YOU: GAS, OIL, STOKER-COAL, ELECTRICITY, ETC.

The FOUNDRY EQUIPMENT C

CLEVELAND 13, OHIO, U. S. A.

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

TOWER* Ovens

IMPROVE WORKING CONDITIONS ...INCREASE PRODUCTION

● Foundries everywhere have increased production and improved coreroom working conditions with Coleman Tower Ovens for these reasons:

PATENTED OPEN CENTER: Provides close, efficient grouping of coremakers around the oven. The exclusive 3-way loading feature increases accessibility 300% over ordinary vertical oven designs. Cuts carry time... increases productivity.

AMAZING FLOOR SAVING: The elimination of racks, aisleways, and large working space required by batch ovens permits savings up to 75% in floor area. Less space...greater output.

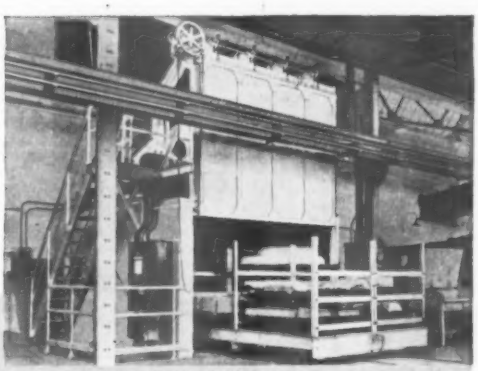
PERFECT BAKING: The Coleman heating system produces perfectly baked cores with unusual speed. Eliminates rejects and make-overs.

RECUPERATIVE COOLING SYSTEM: Cores are "smoked off" and cooled before they reach the unloading station, making for better working conditions. The heat recovered from the cores is used over again, resulting in large fuel savings.

*Trademark Reg. U. S. Pat. Off.

WRITE TODAY FOR BULLETIN 48

COLEMAN TOWER OVENS ARE AVAILABLE IN A WIDE RANGE OF SIZES AND CAPACITIES FOR VARIOUS PRODUCTION NEEDS, ASSURING DEPENDABLE PERFORMANCE AT LOWEST POSSIBLE COST



★ **COLEMAN CAR-TYPE OVENS**

For baking large cores or drying molds. Coleman Car-Type Ovens are used by most of the leading producers of heavy castings.

★ **COLEMAN TRANSRACK OVENS**

For use with portable racks to reduce handling labor. Very efficient where ample floor space is available.

COMPANY

BUILDERS OF COLEMAN AND SWARTWOUT OVENS

MEMBER

MANUFACTURERS FOUNDRY EQUIPMENT ASSOCIATION, INC.

COLEMAN

CORE AND MOLD OVENS

OVER 9000 SUCCESSFUL INSTALLATIONS

The PRESSED STEEL CO.

PSC

ANNEALING CONTAINERS & COVERS

In Any DESIGN ALLOY SIZE QUANTITY

Do you need a special type of annealing equipment?...We have designed containers and covers for every imaginable product.

Have you a temperature problem?...We fabricate from the entire list of heat-resisting alloys.

Are size of the equipment or quantity required a cause for consideration?...As indicated by the illustrations, we furnish boxes, baskets, etc., for the smallest parts, or covers for the biggest steel mill anneals -- singly or by carload.

Weigh Up to 2/3 Less. Save Time and Fuel

Here are 4 ways that "Pressed Steel" light-weight annealing units cut costs and speed production, as shown by plant records:

1) FUEL SAVING--Made of light gauge welded sheet alloy, they require less fuel and time to attain pot heat.

2) LABOR SAVING--Handle easier and faster.

3) REPLACEMENT SAVING--Some installations have been in constant service for 20 years.

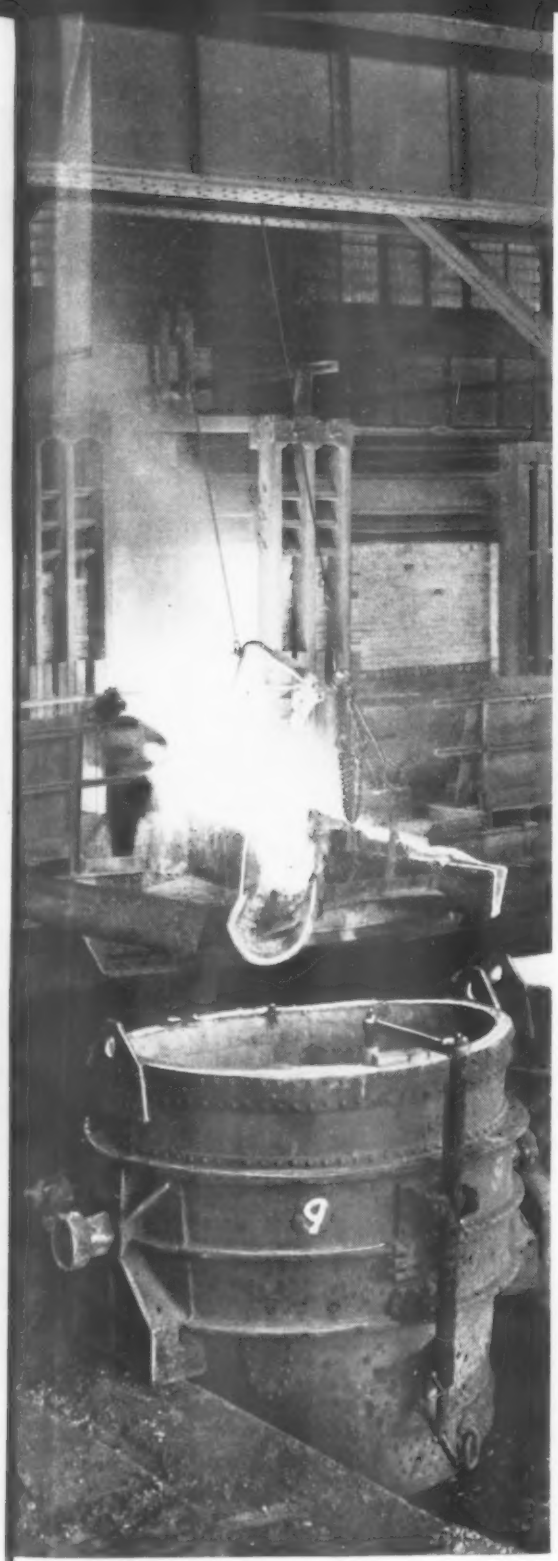
4) SPACE SAVING--Being less bulky than cast units, installations have frequently doubled furnace capacity.

We furnish a complete line of annealing and carburizing boxes, covers, baskets, racks, tubes, retorts, etc. As pioneers of sheet-alloy heat-treating equipment, we offer a wealth of experienced engineering assistance. Send blue prints or write as to your needs.

THE PRESSED STEEL COMPANY
of WILKES-BARRE, PENNSYLVANIA

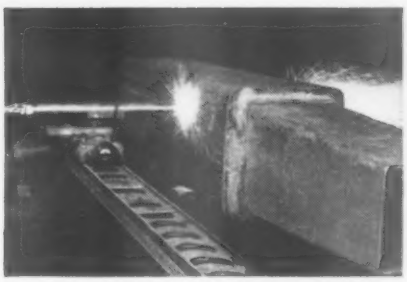
Industrial Equipment of Heat and Corrosion Resistant WEIGHT-SAVING *Sheet Alloys*

☆ ☆ ☆ OFFICES IN PRINCIPAL CITIES ☆ ☆ ☆

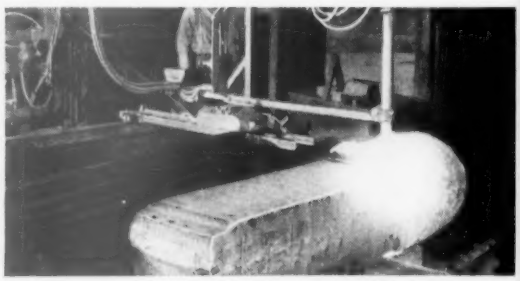


At the blast furnaces and open hearths, oxygen plays an important part. Furnace-tapping with the oxygen lance—oldest use of oxygen-cutting in steel plants—still saves time and reduces hazards.

Help on the Hot and Heavy Jobs



Ingots requiring 200 hours for mechanical "parting" have been split with the OXWELD C-45 heavy-duty blowpipe and then machined in 14 hours total time.



Cutting the hot top off this 26-inch forged slab with the C-45 blowpipe took less than 10 minutes and left the slab end square and undeformed.

The deseaming blowpipe, equipped with the OXWELD starting-rod feed, has reduced conditioning costs more than 50 per cent.

Draining furnace salamanders by oxygen-lance tapping has reduced furnace down-time more than three weeks in some steel plants.

LINDE service engineers who co-operate closely with the steel industry—have combined experience, knowledge, and practical "know-how" to help make better steel, faster, and at lower cost.

LINDE engineering service is always available to LINDE customers through the nearest LINDE office.

Linde

The words "Linde" and "Oxweld" are registered trade-marks of Units of Union Carbide and Carbon Corporation.

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

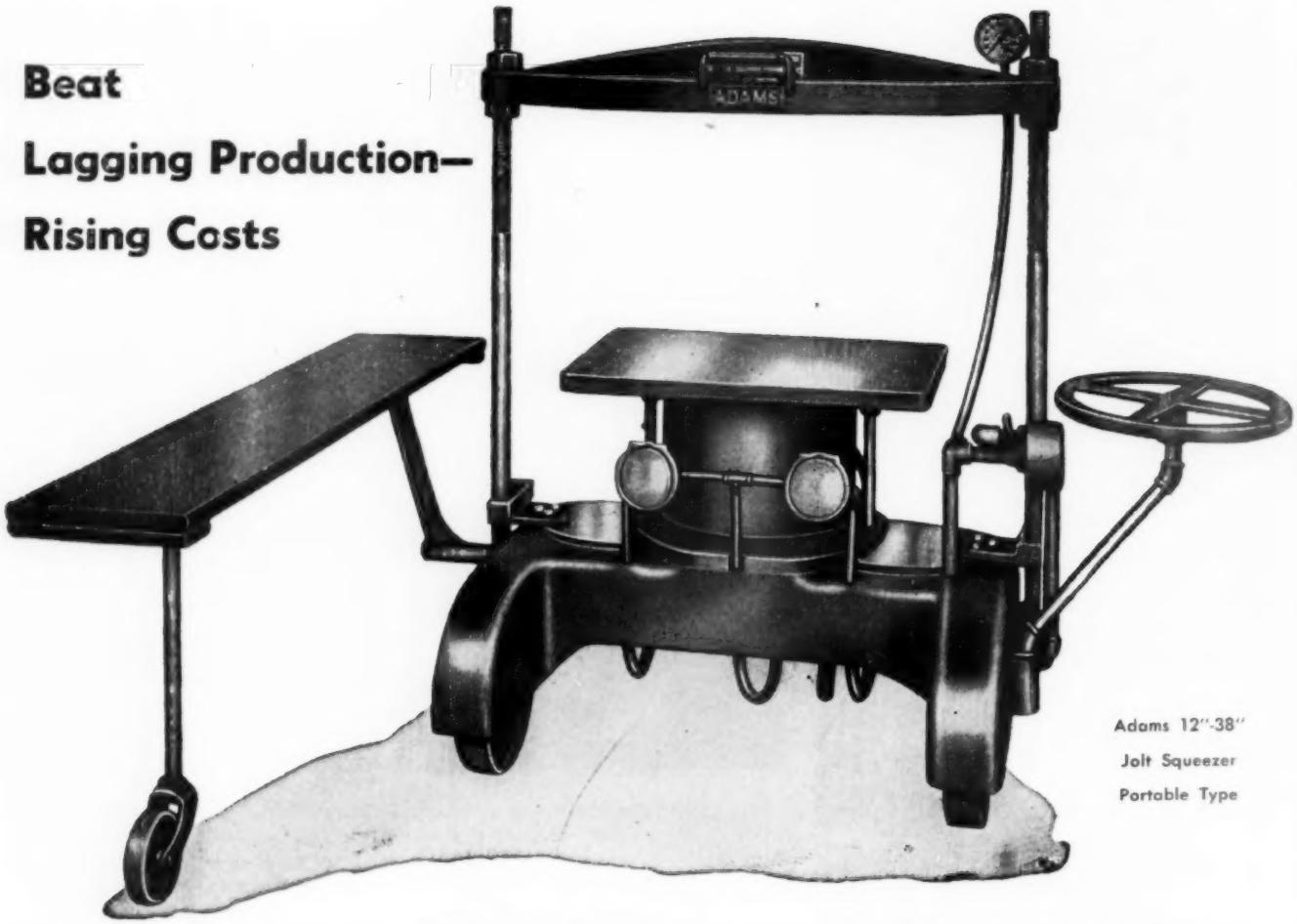
30 East 42nd St., New York 17, N.Y. UCC Offices in Other Principal Cities

In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

Beat

Lagging Production—

Rising Costs

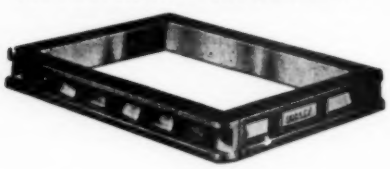


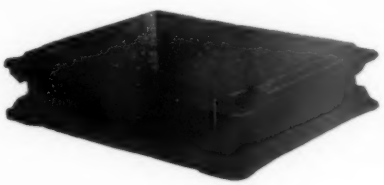
Adams 12"-38"
Jolt Squeezer
Portable Type

ADAMS MOLDING EQUIPMENT

You'll get more and better molds, faster and at less cost when you use Adams Molding Equipment. There is a complete range of Adams high quality custom-built flask equipment, designed to give longer life and better service. Adams Molding Machines give you uniformly perfect molds, high production at lower cost per man hour. They are made in a variety of sizes and styles to meet virtually every requirement. Adams experienced foundry engineers will gladly supply complete details. Write for Catalog 705.

THE ADAMS COMPANY
700 FOSTER St., DUBUQUE, IOWA





The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.

HOW TO UNLOAD A BOX CAR *FAST*

Payloaders Handle

SAND
SLAG
COKE
CASTINGS
LIMESTONE
CLAY
SCRAP
SPRUES

The production of castings involves the varied handling of sand and other bulk materials. These must be unloaded, transported, stored, lifted, dumped, spread, windrowed and loaded day after day. The unloading of box cars is only one of these vital material handling jobs that seriously effect production costs.

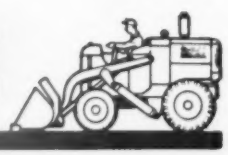
The Model HA Payloader was designed primarily to provide a flexible and efficient method of handling these many bulk material handling jobs as encountered in the foundry. Its greater horsepower has meant full loads on every trip regardless of the materials handled. Its rear-wheel steering has meant quick turning inside box cars and within narrow aisles. Its large pneumatic tires and unusual visibility has resulted in greater speed combined with greater safety. That's why Model HA Payloaders unload box cars at rates up to 50 tons per hour under certain material and distance conditions.

Hundreds of foundries are solving their normal loose-material handling problems with PAYLOADERS, also using them for *extra* jobs such as snow removal, yard and floor clean-up, dump leveling and grading. It will pay you to get *all* the facts about the all-around performance of the PAY-LOADER line — facts based on 28 years of materials handling experience. The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Illinois.

SEND FOR LITERATURE on the 10½ cu. ft. Model HA Payloader, the ¾ yd. Model HF, the 1¼ yd. Model HL or the 1½ yd. Model HM — also the 2 yd. Payloader Buggy.

SAY "HUFF"

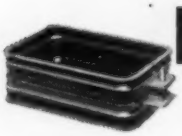
HOUGH
PAYLOADER
Manufactured by THE FRANK G. HOUGH CO.



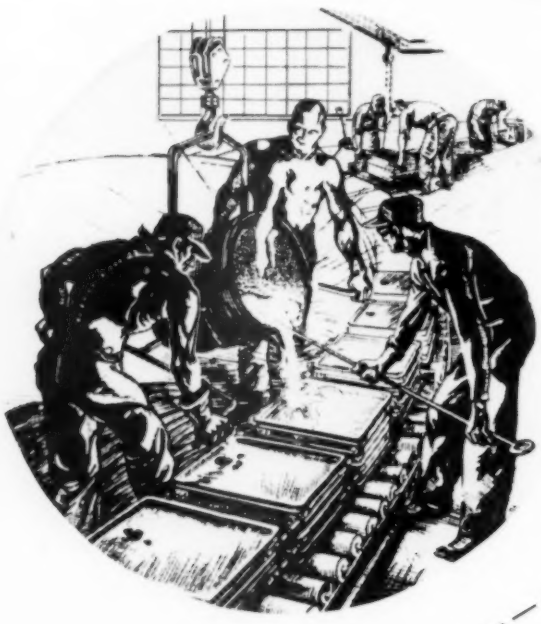
Truscon has the

technical service

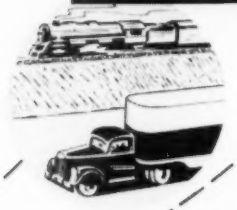
design



steel materials



deliveries

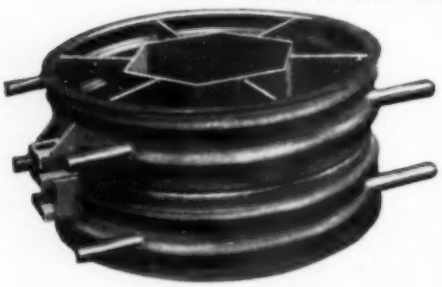


you need in

foundry flasks

Above:
Model TM-10
two man flask

Below:
Model TM-60
two man round flask



. . . and they all add up to *better production* for you!

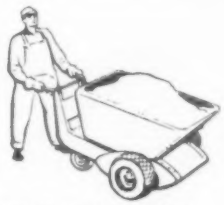
Better production because Truscon Steel Flasks are efficient . . . are made to fit specific, individual foundry jobs.

Better production because Truscon Steel Flasks assure *continuous* production! They're made strong where strength is needed... made of rugged heavy gauge steel that wears as only steel can wear... month after month, year in, year out!

Truscon's prompt delivery service helps foundry production, too, because Truscon gets the flasks you need *where* you want them *when* you want them. Truscon men will be glad to work with you and for you to help select the right flasks for *your* particular jobs.

Send for Truscon's catalog complete with specifications and details on Truscon Steel Foundry Flasks.

TRUSCON STEEL COMPANY
PRESSED STEEL DIVISION
6100 TRUSCON AVENUE • CLEVELAND 4, OHIO
SUBSIDIARY OF REPUBLIC STEEL CORPORATION

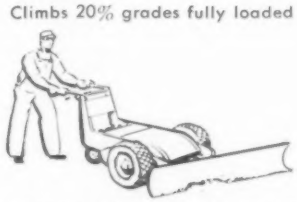


Bucket holds 10 cubic feet . . . 18 with sideboards

Mechanically dumped . . . operates by foot pedal

9-square-foot steel platform takes half-ton loads

Climbs 20% grades fully loaded



50-inch steel blade makes Prime Mover an efficient snow plow

FEATURES:

- gear driven . . . no belts or chains
- fully enclosed engine protected against dirt and moisture
- clutch, engine, transmission all run in oil
- switch from bucket to platform without tools . . . in less than a minute
- turns in its own length (63½"); width 31½"
- 3-gallon tankful of fuel gives 8 hours continuous service

A PRODUCT OF

BELL *Aircraft*

CORPORATION

*Patents & T. M. Reg. Pending Copyright, 1949

The BELL Prime Mover

. . . here's what foundries say about this versatile, cost-cutting machine

Rochester, N. Y.—"We save from 8 to 24 man-days each week with a Prime Mover. It hauls sand 500-600 feet from outside storage bins to inside bins, then to bench and floor moulding operations. Also use bucket to haul silicon and fire clay. Platform-equipped Prime Mover is used to move pig iron to inside storage room near charging elevator."

Detroit, Mich.—"Prime Mover takes brass borings from box car to storage pit via scales. Then to foundry for casting. We carry 1150-pound loads, which is *twice as much as can be carried by wheelbarrow operated by two men.*"

Charleston, W. Va.—"This is a small foundry and, because of the extra load carried by the Prime Mover and the machine's ability to work in narrow aisles, the operator of the Prime Mover saves enough time in the distribution of sand so that he can also operate the muller."

Linfield, Pa.—"Prime Mover used to distribute core and moulding sand, to remove cupola residue, to distribute concrete from ready-mix truck for periodic pouring on sections of floor. Estimated savings of 2 to 4 man-days daily with one machine."

● Convincing as these statements are, they still do not do full justice to this remarkable machine. Only an on-the-job demonstration can prove to you what the Prime Mover can mean in your own foundry. If you would like to see a demonstration and evaluate this machine yourself, we'll gladly arrange one through a member of our nationwide sales and service organization. For more information, sign this coupon and attach to your letterhead.

SEND COUPON NOW

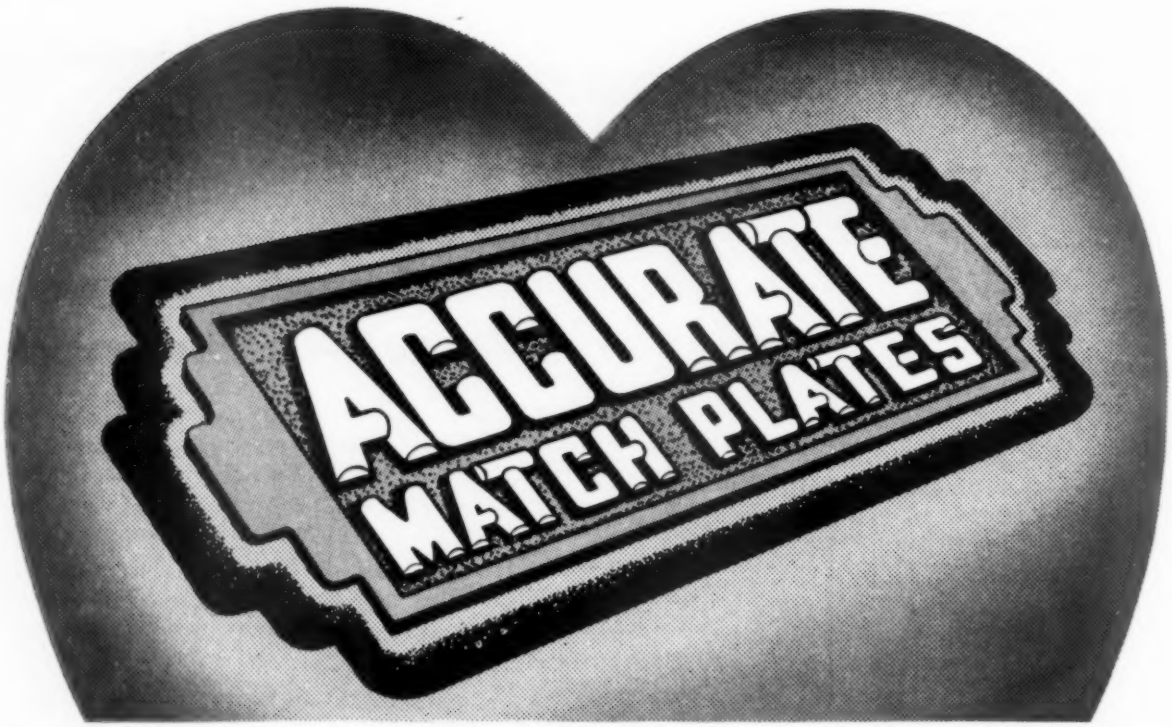
BELL AIRCRAFT CORPORATION,
Post Office Box 1D4 Buffalo 5, New York

Please send me facts on the *Bell Prime Mover*. Who is the nearest distributor?

Name ..... *Company* .....

Address .....

City, Zone, and State .....



The heart of every casting is the pattern...so it has to be "accurate"

The ACCURATE MATCH PLATE COMPANY is a specialized organization with the ability to meet your requirements accurately.

We are foremost in the manufacture of pressure cast match plates, both as to quality and quantity.

Our plant is a modern building, housing specialized equipment and highly skilled artisans under able supervision.

We manufacture the following types of PRESSURE CAST EQUIPMENT from Plaster Molds:

Aluminum MATCH PLATES, COPE AND DRAG SETS,
CORE BOX CASTINGS, and white metal and aluminum
PATTERN CASTINGS.

Aluminum cast under pressure in plaster molds insures accurate dimensions, adherence to detail and smooth surfaces.

DESCRIPTIVE BROCHURE UPON REQUEST

QUICK DELIVERY BY RAIL EXPRESS OR AIR FREIGHT

Pick-up and delivery by jobber representatives in the following areas:

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John M. Donohue
Bluemound 8-8989

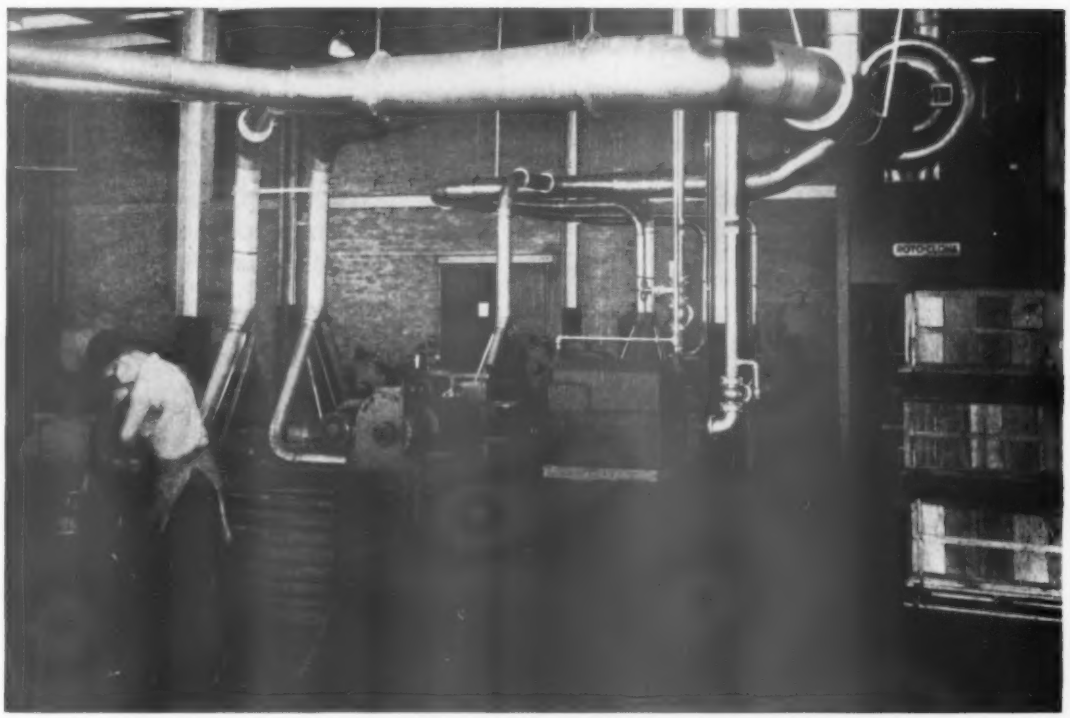
WORCESTER, MASS.
Henry A. Kottmann
Auburn 2683

LOS ANGELES, CAL.
McGowan Company, Inc.
TRinity 2057

NORMAL, ILL.
Clarence C. Schmidlin
Normal 8743-1

ACCURATE MATCH PLATE COMPANY
1847-51 W. CARROLL AVE., CHICAGO 12, ILL.
TELEPHONES: SEeley 3-7918, 3-7919

ROTO-CLONE gives dust a One-Way Ticket



Battery of stand grinders used for foundry snagging operations is served by two Type D Roto-Clones.

DUST can't linger here to cloud the atmosphere, foul-up equipment and irritate workers. The moment it is generated, it's on its way out via Roto-Clone*.

This battery of stand grinders used for snagging castings is served by two Type D Roto-Clones installed back to back. Note the compactness of the installation. Location of the Roto-Clones at dust source eliminates long, costly pipe runs.

Constant efficiency, uniform air volume, small space requirement, low cost and ease of installation—these are the features of the Type D Roto-Clones that have made this unit a leader in the industry's winning battle over dust.

A Type D Roto-Clone Dust Control System may be installed as a central type with main duct and branch connections (as pictured), or as an individual unit serving a single dust-producing operation. For complete information, call your local AAF representative or write direct to:

IT'S A FACT! More grinders are exhausted by the Type D Roto-Clone than any other type of dust collector. Bulletin No. 272 A tells the story. Write for it now!

MEMBER MANUFACTURERS ASSOCIATION FOUNDRY EQUIPMENT INC.

AMERICAN AIR FILTER COMPANY, INC.

266 Central Avenue, Louisville 8, Ky.

In Canada: Darling Bros., Ltd., Montreal, P. Q.

®AAF

ROTO-CLONE®
DUST CONTROL EQUIPMENT

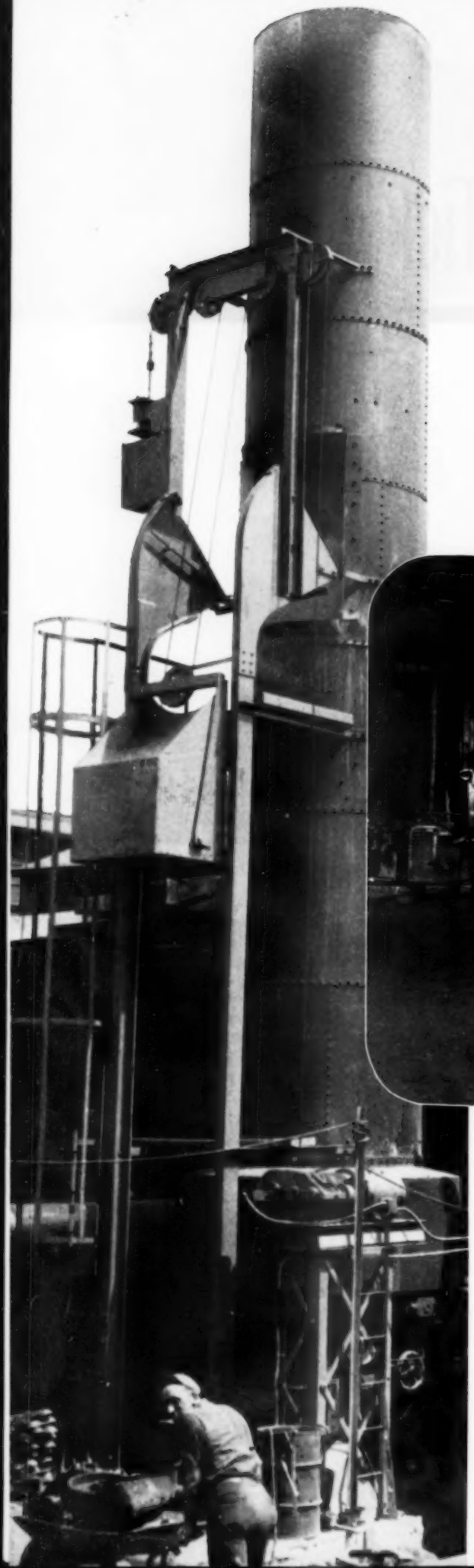
**Roto-Clone is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydrostatic precipitator types.*

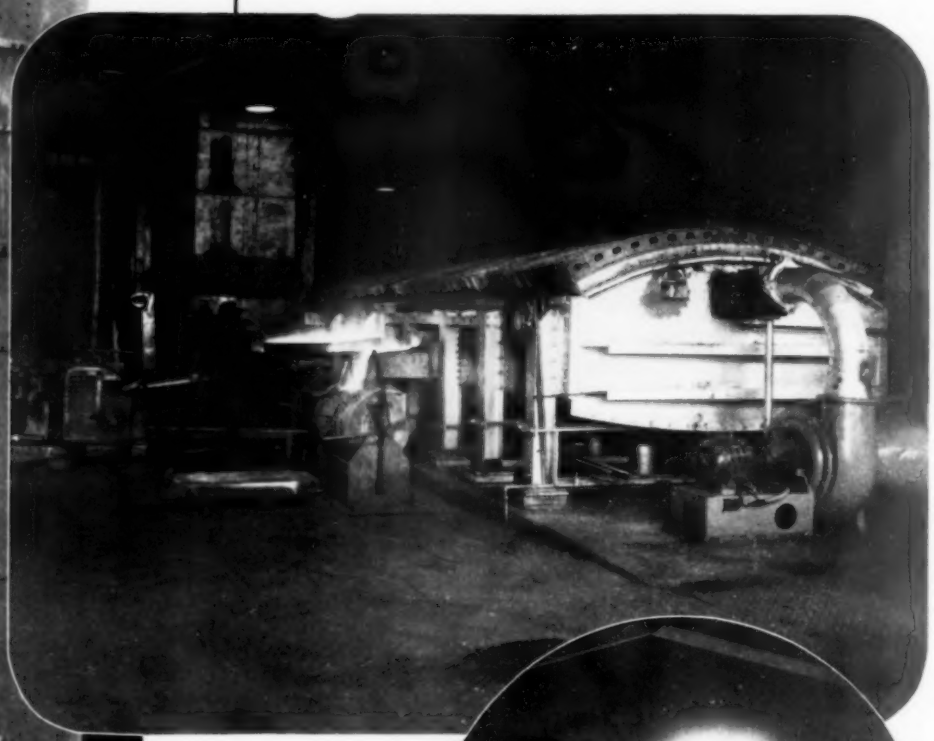
for Hot

LET WHITING EXPERIENCE HELP

WHITING has no ax to grind. Whiting offers a complete line of successful melting equipment.

Whiting engineers are well versed in foundry melting economics . . . and the advantages and disadvantages inherent in every melting unit.





DUPLEXING

—combines the advantages of two or more melting units. Here the workman taps duplexed malleable iron from an air furnace.

WHITING CUPOLAS

—now melting more than 90% of the grey iron casting produced in the United States.

SIDE-BLOW CONVERTERS

—refine steel at low cost to any desired quality. Sulfur content can be effectively controlled.

Metal at Low Cost—

YOU SELECT EQUIPMENT BEST SUITED TO YOUR OPERATIONS

Whiting foundrymen have the practical experience necessary to analyze your particular problems and recommend the melting equipment that will bring the best results in your individual case. Over 60 years of experience are your assurance of capable service.

Knowing the wealth of information available through this organization, many of America's most successful foundries—small as well as large—bring their problems to be solved by Whiting engineers.

Can we help you?

ELECTRIC FURNACES

—with famous Hydro-Arc advantages . . . hydraulic electrode positioning and floor-operated electrode clamps. Photo shows a top charge model.

CRADLE FURNACES

—provide a constant supply of homogenous super-heated metal. Photo shows 10-ton size Cradle Furnace.

WHITING
CORPORATION

15607 Lathrop Avenue, Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, and Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church Street, New York 7, N. Y.

CASTFLUX

Reduces Casting Rejects To a New Low Point Never Before Obtained In the Industry

CASTFLUX
TRADE MARK REG.

The "National" Dual Purpose Flux

In the Ladle

FLUIDITY
Is Materially Increased
Purifying the Metal.

YOU ALSO GET

- Closer Grained Castings
- Fewer Rejects
- Fewer Miss Runs
- Less Remelting
- Longer Ladle Life
- Less Ladle Chipping

at a cost of

10¢ to 15¢

PER TON
OF METAL TREATED

On Both Blind and Open Risers . . .

Castflux raises the temperature of the metal to a higher degree and substantially increases and maintains the fluidity of the metal during the entire cooling-down period.

UNCONDITIONALLY GUARANTEED

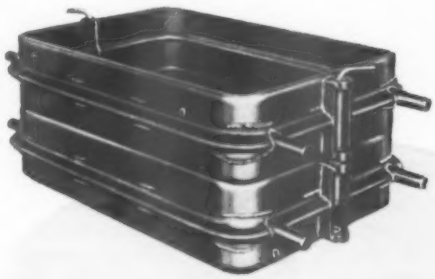
Unless Castflux meets with your full approval material can be returned, providing we are notified within 30 days after receipt of material.

NATIONAL

PIGMENT COMPANY
2115-2117 EAST YORK STREET
PHILADELPHIA 25, PA.

6 POINTS OF SUPERIOR VALUE in BS&B FOUNDRY FLASKS *plus!*

● BS&B builds them right . . . quality materials, skilled workmen, supervised by foundrymen. ● All-welded steel construction lasts longer. ● They are lighter . . . yet stronger. Easier to handle, hold shape longer. ● Adaptable to ready use for bench, squeeze, jolt squeeze, strip squeeze and rollover methods. ● Made to any tolerance for precision performance. ● BS&B tailors them to your specifications . . . our experienced staff is ready to serve you.



AND . . . Black, Sivalls & Bryson Foundry Flasks are nationally advertised and nationally distributed. Users of castings now recognize the greater precision of castings produced in BS&B flasks. They expect the best. Give it to them . . . with BS&B!

NEW CATALOG NOW READY!

A wealth of vital information for the foundryman! Complete data, facts and figures. Rip out coupon, fill it in . . . get it in the mail TODAY! Black, Sivalls & Bryson, Inc., Special Products Division, Section FF10, Power and Light Bldg., Kansas City 6, Missouri.

BS&B FOUNDRY FLASKS

BLACK, SIVALLS & BRYSON, INC.
Special Products Division, Section FF10
Power and Light Bldg., Kansas City 6, Mo.

Send me your new catalog . . . packed with foundry information and full details about BS&B Foundry Flask ☐ Have a Sales Representative call.

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Increase Production

with the

ROTOPLANE SPEED SIFTER ★ RED ELECTRIC VIBRATORS

ROTOPLANE SPEED SIFTER

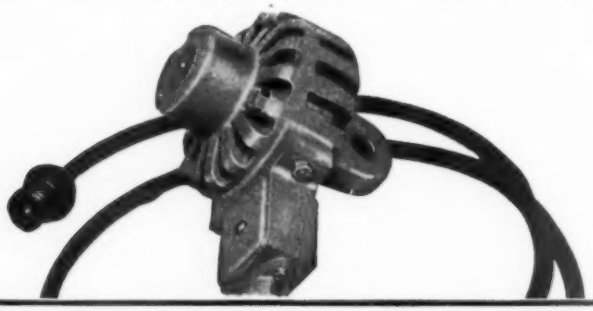
The ROTOPLANE Speed Sifter is an *improved* sand riddle of much greater capacity and much longer life. One size and type serves all purposes in the foundry—does *all* your sifting more quickly and economically.

It is easily handled by one man, weighs approx. 90 lbs., is 62 in. high overall. The one-piece frame of tough aluminum alloy makes for a remarkably effective vibration. Its smooth, free, rotary action vastly increases bearing life; all bearings grease packed. All mechanism of the ROTOPLANE is *completely* enclosed—no bearings or activating parts of any kind exposed to dust and grit.

The Quick-Change Sieves are instantly interchangeable, mounted in smooth, flat steel ferrule, with 20-inch diameter clear sifting area. No jagged edges to tear workers' hands, no storage problem.

$245.00 f.o.b. Chicago—complete with cable, safety ground wire. Standard 1/3 h. p. motor, 110 volt, 60 cycle, single phase and 220 volt, 1 or 3 phase.

UNIVERSAL FREE - WHEELING RIDDLE equipped with motor as above $225.00



RED ELECTRIC VIBRATORS

True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

(All Prices f.o.b. Chicago)

No. 1—Light match plate work	$12.00
No. 2—Medium match plate work	15.60
No. 5—Heavy match plate, tub and bench work	20.40
No. 9—Machine and heavier work	28.80

Third (ground) wire per U. S. Govt. code—furnished with No. 9 at no extra cost; $1.20 extra with Nos. 1, 2 and 5 vibrators.

KNEE SWITCHES for operating Red Electric Vibrators:
Single pole $5.00, Double pole $6.50.

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street **Chicago, Illinois**

CABLE ADDRESS: "ROTOPLANE CHICAGO"

INCREASE FOUNDRY PRODUCTION with "dag" Colloidal Graphite

YOU get more efficient foundry operation . . . substantial production increases . . . you have better working conditions . . . when you spray or brush **"dag"** colloidal graphite dispersions on chills, patterns, and permanent molds. Rapid clean parting and smoother surfaces are assured because the exceedingly thin dry film of **"dag"** colloidal graphite resists oxidation, minimizes gas pockets, and permits easy removal of castings.

Foundrymen find that **"dag"** colloidal graphite dispersions do not affect casting . . . dimensions are held to close tolerances. Better mold production is secured, with longer mold life and easier parting; choking fumes and smoke are reduced to a minimum. Also, binding and stripping of push pins, shoulder screws and flask pins are eliminated by brushing or spraying with **"dag"** colloidal graphite dispersions.

An Acheson Colloids engineer will be glad to advise you on how to use **"dag"** colloidal graphite. The coupon will bring detailed information . . . without obligation, of course.

Branch offices in Boston, New York, Philadelphia, Pittsburgh, Cleveland, Detroit, Chicago, St. Louis, Los Angeles, San Francisco, Toronto.

Coating permanent mold at the Thomas Paulson & Son, Inc. foundry, Brooklyn, New York.

ACHESON COLLOIDS CORPORATION
PORT HURON, MICHIGAN

☐ Send me more information
☐ Send a sales engineer at my convenience

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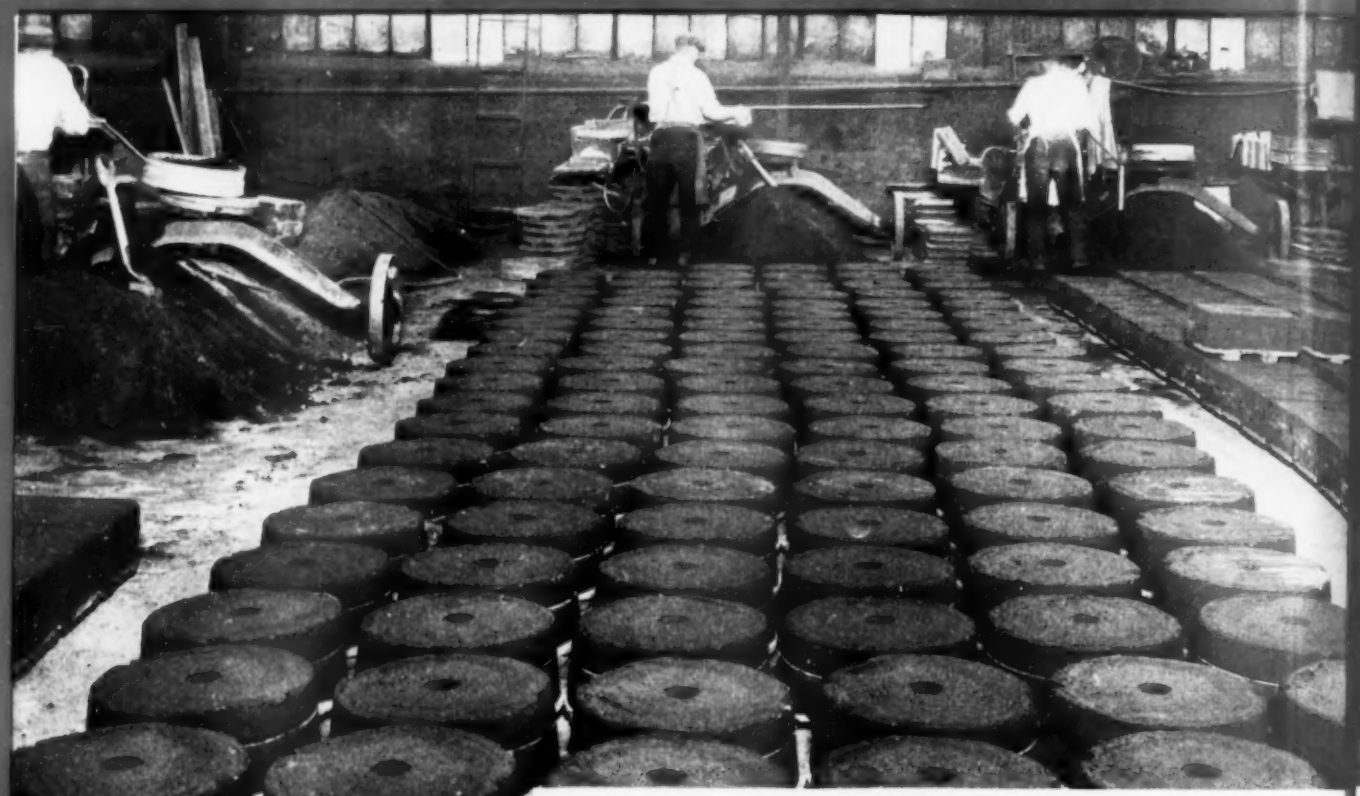
ACHESON COLLOIDS CORPORATION

dag COLLOIDS

Port Huron, Michigan

Round Flasks and



. . . SAVES TIME AND

THE HINES

3431 WEST 140th ST.

Jackets by Hines

SAND ON THESE JOBS

FLASK CO.

CLEVELAND 11, OHIO

76%

OF LANLY OVEN ORDERS

in recent years

have been REPEAT orders

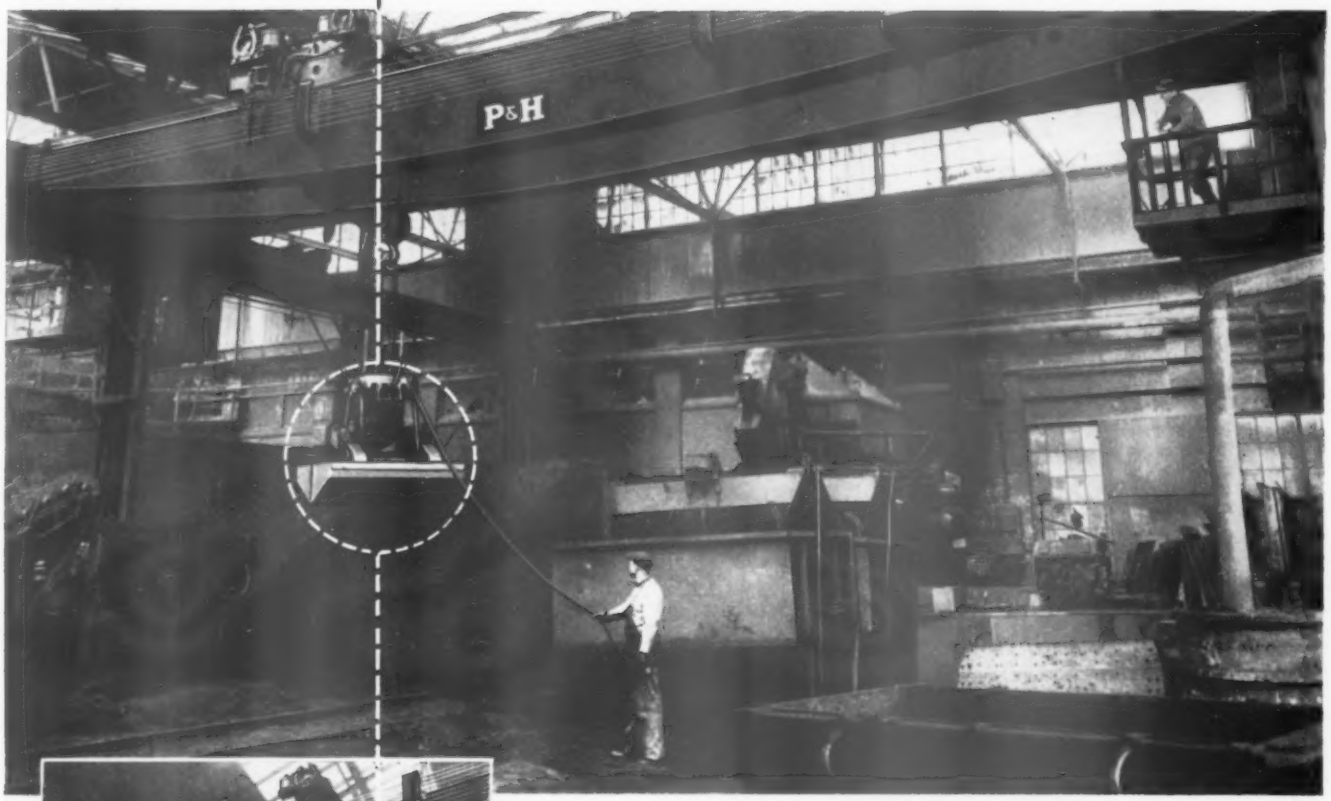
Isn't this a significant fact **that should prompt you to contact Lanly for any information desired regarding ovens, dryers, or furnaces . . . for drying, baking, heat treating, conditioning, dehydrating, etc.?**

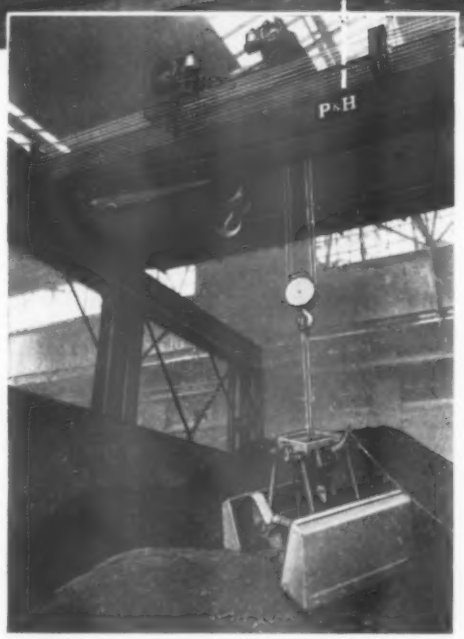
Literature is available of course.

HEATED BY GAS, OIL, ELECTRICITY OR STEAM

750 PROSPECT AVENUE · CLEVELAND, OHIO

P&H SINGLE LINE GRAB BUCKETS





a "*Natural*" in foundry service!

In a matter of seconds you can attach the P&H Single Line Grab Bucket to your crane hook and it's ready to go to work. It's as simple as that — and it provides easy, accurate one-man operation. It works fast, bites deep, picks up clean.

Here's the fast, easy way to handle all kinds of bulk materials — sand, coke, crushed stone, cinders, etc. It's widely used to unload cars, dig pits, fill flasks, etc. A "natural" for foundry use if there ever was one.

Available in capacities from ½ to 2½ yds. Write for all the facts about it. Ask for Bulletin C-27.

P&H

GRAB BUCKETS
4405 West National Avenue
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION
ELECTRIC CRANES · EXCAVATORS · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

Gray Iron piston for 800-horse-power, engine-driven compressor.

"it wears like iron"...

TRUE... OR FALSE?

When you want to express the superlative in wearing quality, you will very probably say, "It wears like iron!" As a matter of fact, the statement is usually a grossly exaggerated one, for *nothing* wears like iron *except iron.*

Note the general use of gray iron castings for moving parts such as gears, sprockets, machine tools, engine cylinders, piston rings, brake drums . . . that is your best evidence of gray iron's wear-resistant qualities.

Wherever sliding friction, galling or wear are serious factors, especially in the presence of heat, Gray Iron does an outstanding job. It gives you an unmatched combination of useful properties . . . *plus ultimate economy.*

Send for free booklet "GRAY IRON—Its Mechanical and Engineering Characteristics, and Details for Designing Cast Components".

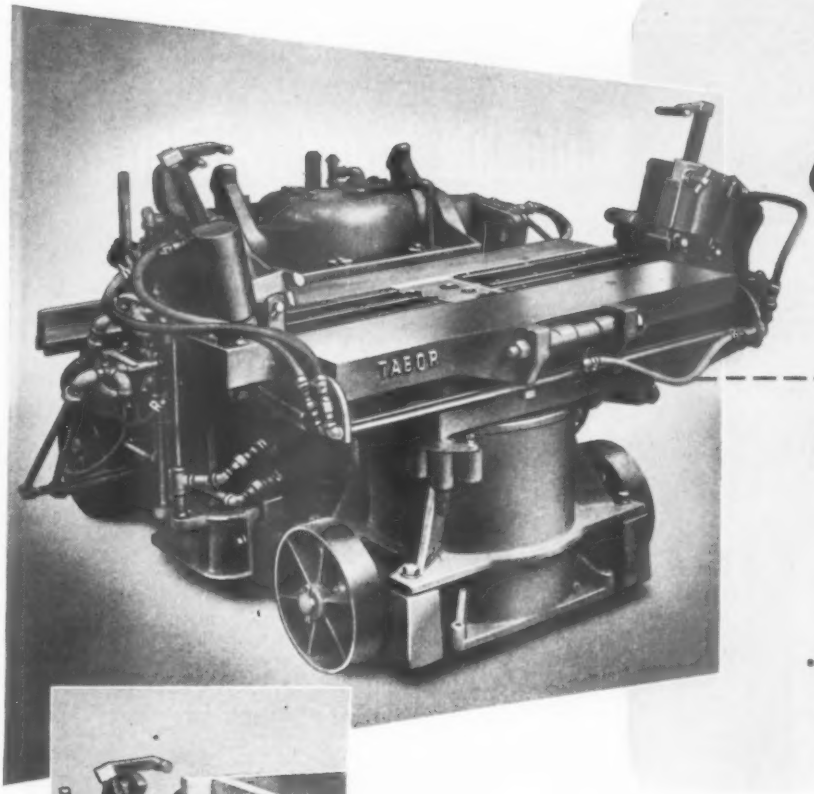
Make It Better With Gray Iron

Gray Iron Characteristics Include:

- Castability
- Rigidity
- Low Notch Sensitivity
- WEAR RESISTANCE
- Heat Resistance
- Corrosion Resistance
- Durability
- Vibration Absorption
- Machinability
- Wide Strength Range

GRAY IRON FOUNDERS' SOCIETY, INC.

NATIONAL CITY BANK BLDG., CLEVELAND 14, OHIO

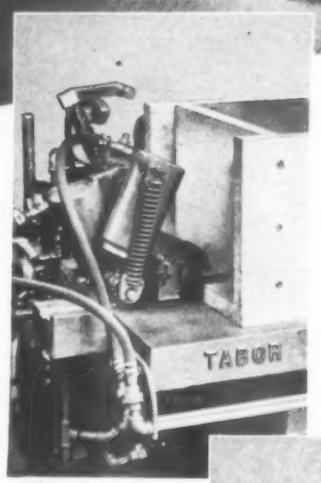


And Now...

TABOR
TRADE 1884 MARK

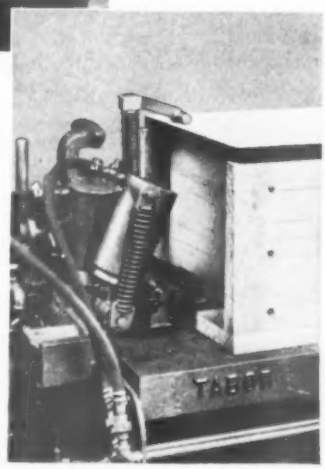
jar, power rollover, power draw *Machines*

..WITH THE NEW QUICK CHANGE-OVER TABLE*



Core box clamped

Core box and core plate clamped



*Can easily be installed in your present Tabor rollover machine if its capacity is within the range of 600 to 3000 pounds.

IT'S a Tabor innovation! The new plate design permits *independent* setting of all four clamps. Always big producers, these machines now lend themselves to exceptionally rapid change-over—become invaluable in either core room or jobbing shop where pattern changes are frequent.

Designed to produce the larger cores—the jobbing shop molds, these machines are furnished either plain jar or shockless. The latter is recommended for upper-floor installation—for freedom from vibration and consequent damage to completed cores.

TABLE OF STANDARD SIZES

Size of Machine	Width of Core Box or Flask		Length of Core Box or Flask		Height—including core plate	
	Min.	Max.	Min.	Max.	Min.	Max.
22"	10"	22"	20"	40"	7½"	14"
30"	15"	30"	26"	46"	8"	18"
40"	20"	40"	28"	56"	12"	25"

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington M. W. Warren Coke Company, 1017 Olive Street, St. Louis 1, Mo.; E. R. Frost Company, Inc., Minneapolis 14, Minn.; Harry H. Reich, Trussville, Ala.

MANUFACTURERS' ASSOCIATION INC. FOUNDRY EQUIPMENT

The TABOR Manufacturing Co.

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
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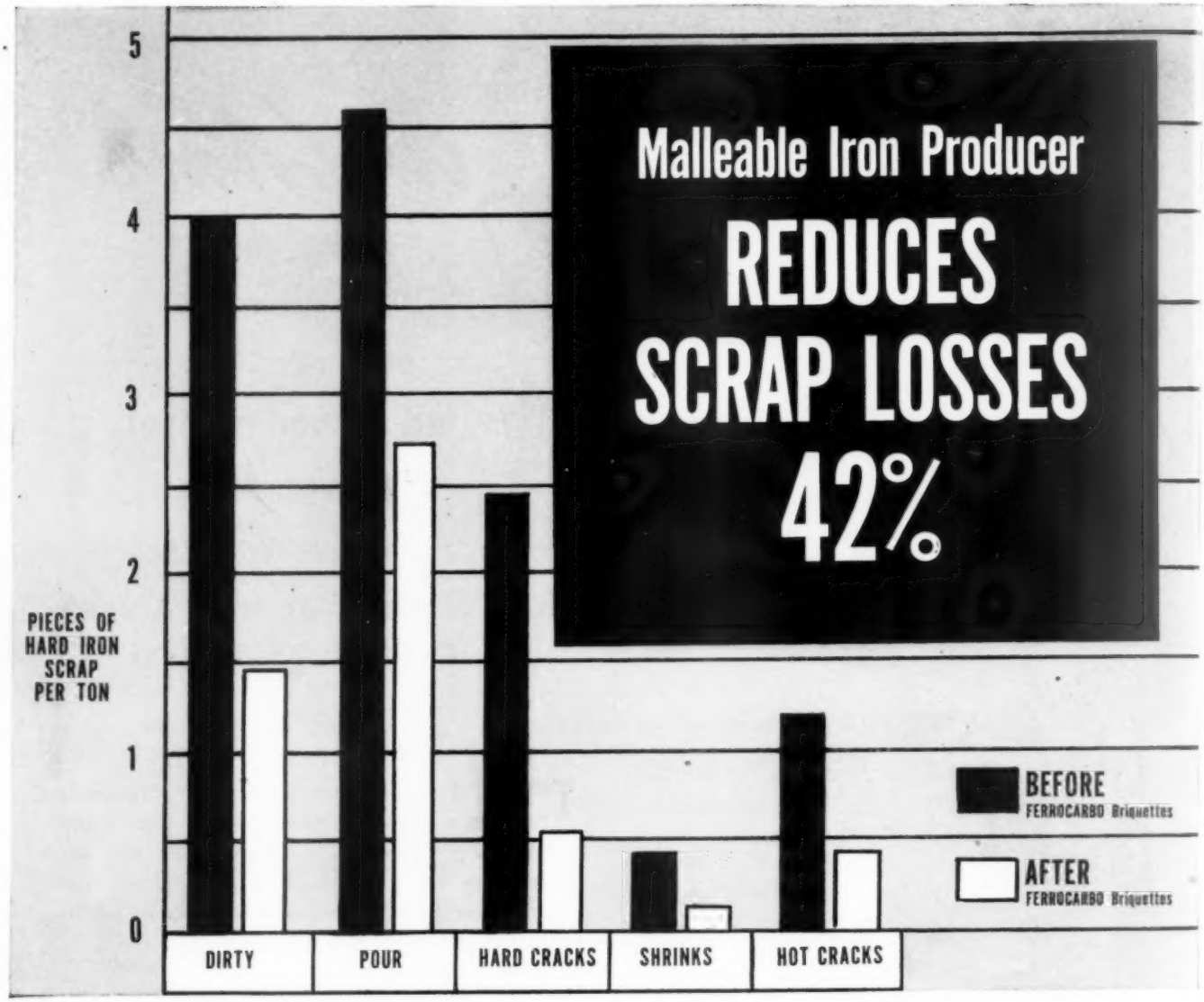

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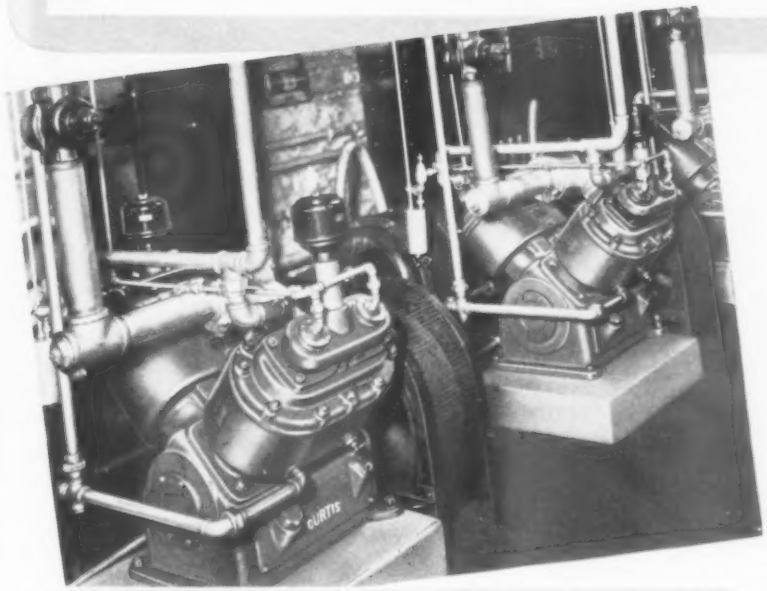

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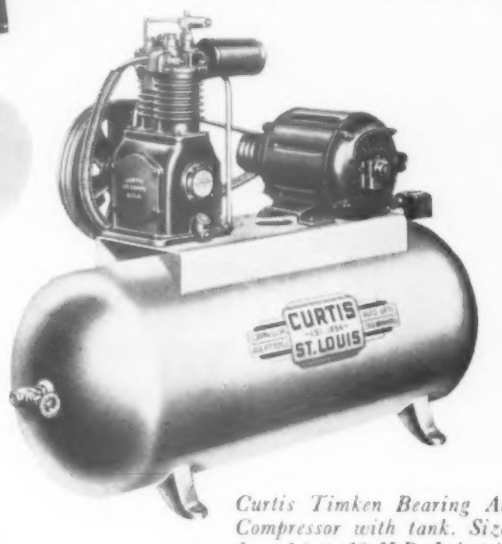

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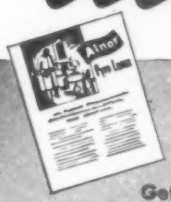

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Jolt Squeezer—Arm type
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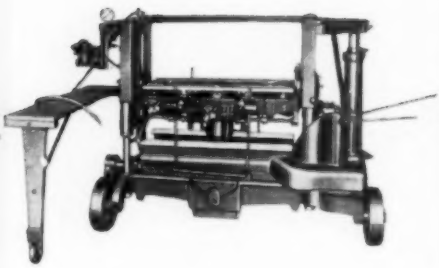
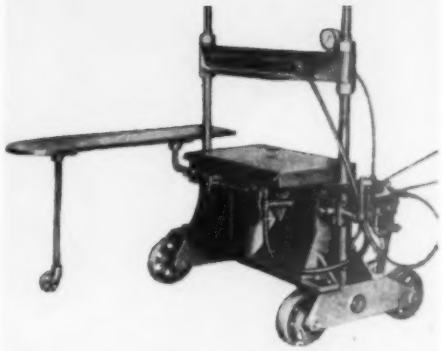
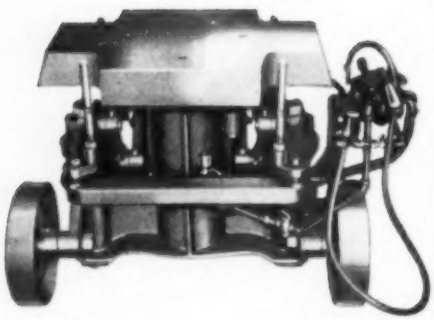


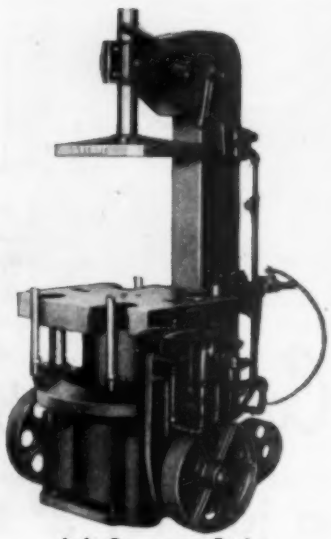
Jolt Rollover Squeeze Draw
4 sizes



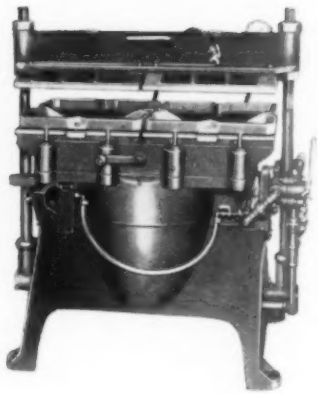
Jolt Squeezer—Strain rod type
2 sizes



Jolt Pin Lift
3 sizes



Jolt Squeeze Strip
4 sizes



Multiple Molding
3 sizes

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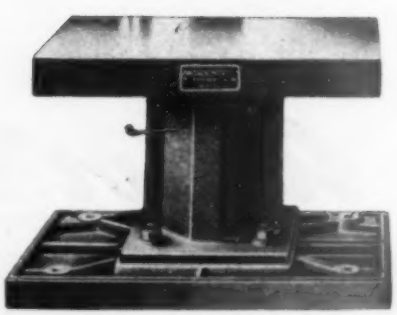


Plain Jolt
6 sizes

Selling Quality at a Profit Is Today's Job

HOW can foundry managers improve the position of their organizations in this period of spotty operations? Undoubtedly many answers can be given to this question, but probably the most important pertain to use of skillful salesmen, development of quality control, and organization of the operation to provide further economies in the manufacturing processes.

As long as demand for castings exceeded production facilities of the foundry industry, there was little need for salesmen. But today, with capacity greater than demand, a foundry without a sales organization will have difficulty in obtaining a fair share of the going business. Experienced engineers, schooled in the intricacies of foundry practice and possessing intimate knowledge of the application of castings as engineering materials, can provide the impetus to meet the challenge of this competitive period.

With foundrymen looking for business, buyers of castings now are shopping around for sources of supply with quality and price the important factors governing purchases. Castings must have the desired properties which will permit them to fulfill the purpose for which they were designed. To hold the business, foundries must be able to meet these requirements, and to continue the production performance throughout the life of the order. If foundry management is to satisfy customers' demands, it will be necessary to utilize all of the latest information on developments in foundry practice, and to see that definite quality control standards are established and maintained.

Pressure for price concessions points to the importance of knowing one's costs and of developing further economies in the production of castings. Meeting this sales resistance with unintelligent and ruthless price cutting can lead only to disaster for those who indulge. Price reductions can come only through lower cost of raw materials, greater productivity per employee, new and better equipment and methods, elimination of waste, and closer supervision.

And while management is endeavoring to meet these problems, it also might be well to take a look toward Washington where a more sane view on new legislation appears to be emerging. If the best interests of all of the citizens are to be served in the new laws, your Senators and Congressmen should have your opinions and advice. Write to them frequently.

Although the slowing in demand for castings appears to have leveled off at the moment, needs of the industry are great. Action on the part of management in strengthening its own organization and in giving support to its representatives in government should solve many problems.

Frank G. Steinebach
Editor

THE FOUNDRY—WHEREVER METALS ARE CAST

High

Fig. 1 — Weighing molten metal for casting piston rings

By TRACY C. JARRETT
Manager of Engineering and Research
Koppers Co. Inc.
Piston Ring Division
Baltimore

Fig. 2—Random flake graphite gray cast iron (AFS-ASTM Type A). 250X, picral etch

Fig. 3—Interdendritic graphite in gray cast iron (AFS-ASTM Type D)

sh-Strength Cast Irons

HISTORY does not record the name of the inventor of cast iron. However, it is said that Theodorus of Samos produced iron statuary in 600 B.C. It is known that the Chinese made cast iron castings as early as 500 B.C. and that the iron industry became a state monopoly in 115 B.C. The iron castings industry became well developed in the Rhineland in the 14th Century, where the castings were poured directly from the "Stuckofen," a crude blast furnace used for smelting ores. Similar furnaces were used for remelting pig iron in France about 1750. A forerunner of the modern cupola was patented by John Wilkinson in England in 1794.

Early castings were usually molded in holes dug from the ground around the melting furnaces, using local soils and clays as mold materials. The term "loam" is still sometimes applied to certain types of molding sands.

The men who practiced the art of castings manufacture kept their findings as closely confined to their own foundries as possible, and it is only since the beginning of the present century that an appreciably free interchange of information between foundries has been practiced through the formation of societies with their meetings and publications.

With the early application of metallurgical science to the steel industry and the reluctance of the iron founders to utilize new methods and information, it is little wonder that cast iron fell into the state of disregard which persists in some quarters until today.

Sauveur in 1912 and Howe in 1916 rendered a great service to the iron castings industry by giving the metallurgy of cast iron substantial places in their pioneering text books. It was not until World War I that metallurgy began to be considered seriously by the iron foundrymen. Between that time and the present, cast iron has regained much of its preeminence as an engineering material.

Cast Iron Metallurgy—Cast iron is probably the most complex of the commercial alloys. But if consideration is given to the graphitic and carbidic phases existant because of the high carbon content, most of the principles of steel casting metallurgy apply equally to cast iron. Both steel and cast iron may be hardened, annealed, normalized, austempered, spheriodized, nitrided or precipitated. In general, the response of the cast iron matrix to the alloying elements is similar to that of steel. There is even a series of austenitic cast irons which correspond to the high-nickel austenitic steels.

Since these principles are well known, we will consider them only briefly and devote most of our discussion to the control of the graphite in cast iron.

The principal difference between cast iron and steel lies in the quantity, mode of occurrence and distribution of the excess carbon in the cast iron. Fig. 4 shows the various ways in which this excess carbon may occur.

Cross section and chemical composition are possibly the most important considerations governing the mode of occurrence of carbon in cast iron. In general, light sections, because of their rapid cooling rates, tend to solidify with their carbon in the form of carbides, while heavy sections tend to graphitize. The flake graphite form may be obtained in light sections by increasing the carbon and silicon content, while white cast iron may be obtained in heavy sections by reducing the carbon-silicon content. Both carbon and silicon are softeners in cast iron and, for high strength, they should be held as nearly to a minimum as possible consistent with good graphite

This paper was presented before the Pittsburgh Chapter, American Society for Metals, Jan. 13, 1949.

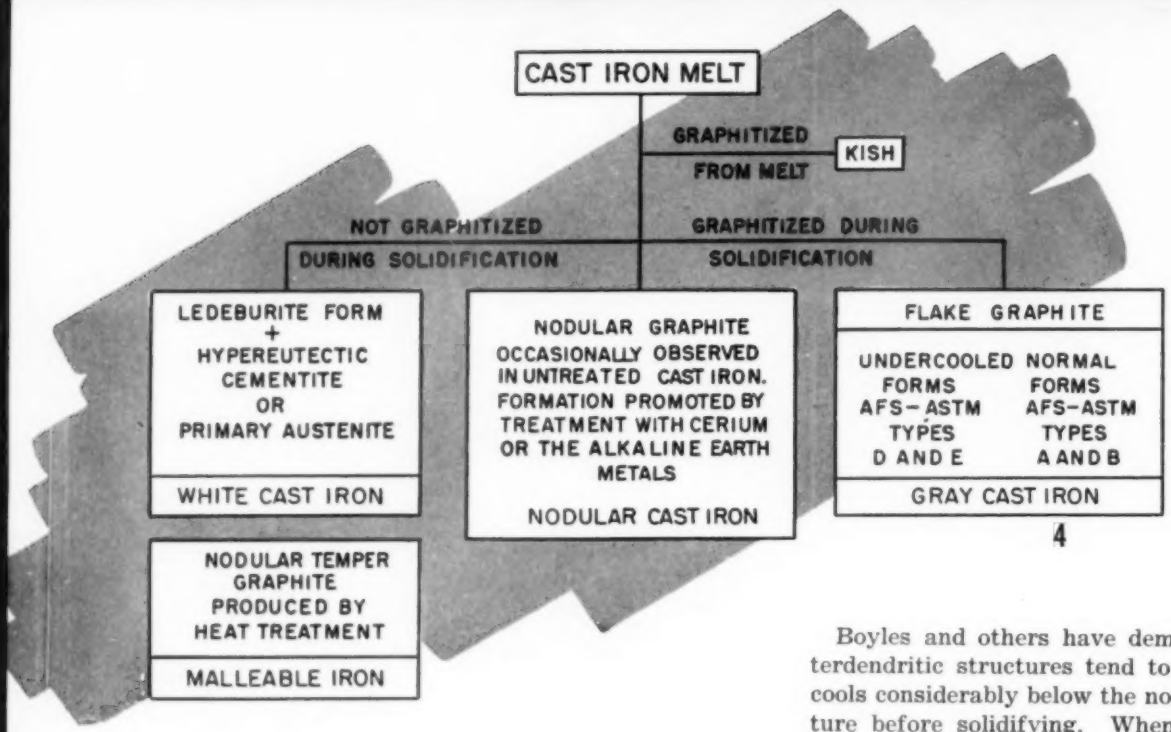

CAST IRON MELT
GRAPHITIZED FROM MELT
KISH
NOT GRAPHITIZED DURING SOLIDIFICATION
GRAPHITIZED DURING SOLIDIFICATION
LEDEBURITE FORM + HYPEREUTECTIC CEMENTITE OR PRIMARY AUSTENITE
WHITE CAST IRON
NODULAR TEMPER GRAPHITE PRODUCED BY HEAT TREATMENT
MALLEABLE IRON
NODULAR GRAPHITE OCCASIONALLY OBSERVED IN UNTREATED CAST IRON. FORMATION PROMOTED BY TREATMENT WITH CERIUM OR THE ALKALINE EARTH METALS
NODULAR CAST IRON
FLAKE GRAPHITE
UNDERCOOLED FORMS AFS-ASTM TYPES D AND E
NORMAL FORMS AFS-ASTM TYPES A AND B
GRAY CAST IRON
4

Fig. 4—Various ways in which excess carbon may occur in cast iron

distribution.

Gray cast iron, with graphite in the flake form, constitutes the bulk of castings tonnage today. A good deal of study has gone into the improvement which has resulted in an understanding of the effect of graphite distribution, quantity and flake size upon mechanical properties. Briefly, to obtain the best mechanical results (1) the graphite flakes should have a random orientation (AFS-ASTM type A); (2) they should be as small as possible for the section cast; (3) the total quantity of carbon and silicon should be as small as possible for the section to be cast.

The interdendritic graphite distribution (AFS-ASTM types D and E) has an adverse effect on strength and impact resistance since it provides more or less continuous paths of weakness through the structure, even though the flake size and the quantity of graphite may be smaller than in an iron with type A graphite. The interdendritic graphite, often accompanied by cementite, tends to form when the carbon-silicon level is lowered. Fig. 2 shows the desirable random flake graphite distribution.

Boyles and others have demonstrated that the interdendritic structures tend to form when the metal cools considerably below the normal freezing temperature before solidifying. When this happens, graphitization is delayed until after the primary austenite dendrites are well formed. The freezing dendrites tend to raise the carbon of the interdendritic melt until it graphitizes in a eutectiform pattern or, if graphitization fails to occur, the interdendritic austenite-cementite eutectic forms.

Various methods have been employed to prevent this undercooling. Possibly the most successful is by inoculating the metal with a silicon alloy just before pouring. This assists in the normal freezing of the metal and the separation of random flake graphite. Inoculation with silicon is effective with the hypoeutectic irons, but has little effect on the hypereutectic irons. Mineral graphite may be used with hypereutectic irons to promote the formation of type A graphite and to prevent chilled edges or cementite formation.

Graphite flake size has received considerable attention in the literature of cast iron. However, it is currently believed that the effect of flake size has been somewhat over-emphasized and that the increase in properties attributed to small graphite flakes is as much due to an accompanying improvement of the matrix structure. Graphite flake size is simply a manifestation of crystal growth. Large

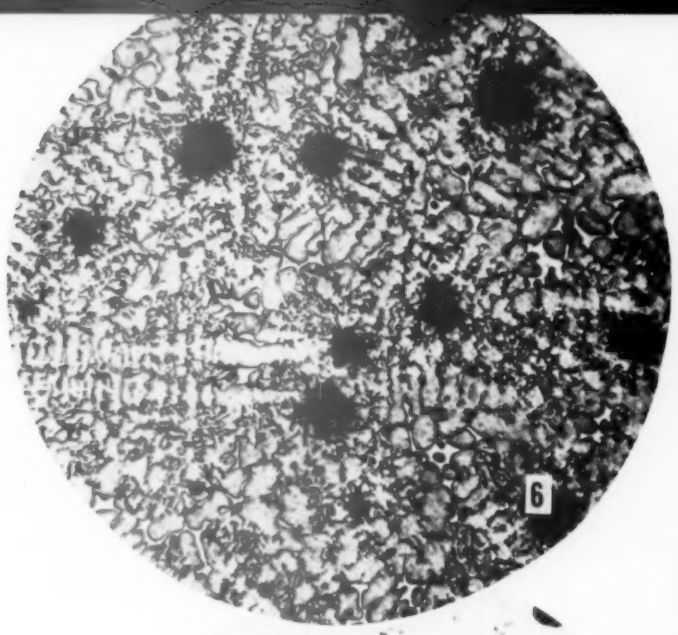
graphite flakes form when the solidification rate is slow; small flakes, when it is rapid. This ordinarily may be tied in with cooling rate and casting cross section. Coarse graphite occurring in the heavy, slow cooling sections; and fine graphite in the light, rapid cooling sections.

Fig. 5 shows the effect of casting cross section on graphite flake size in cast iron having the following analysis: Total C 3.59 per cent, Si 2.05 per cent, Mn 0.58 per cent, P 0.37 per cent, S 0.072 per cent. Note the occurrence of small quantities of type D graphite in the ⅜-in. and ¼-in. sections (Figs. 5E and 5F) Table I shows the mechanical properties obtained from the materials shown in Fig. 5.

A measure of control over graphite flake size may be accomplished independently of casting cross section. As was stated previously, low-carbon low-silicon irons tend to solidify with considerable undercooling. When this is insufficient to cause type D graphite or when undercooling is prevented by inoculation, a relatively fine type A graphite may form in heavy cross sections.

In general, a carbide stabilizing element such as chromium or molybdenum causes a mild refinement of graphite flake size, while graphite-forming elements such as silicon, aluminum and nickel have a coarsening effect upon the graphite. The element titanium, while it is sometimes considered a graphite forming element, increases the tendency of the metal to undercool and to form types D and E graphite. Tellurium and selenium have somewhat similar effects.

Nodular Graphite—Considering cast iron to be a steel matrix with inclusions of graphite, the maxi-



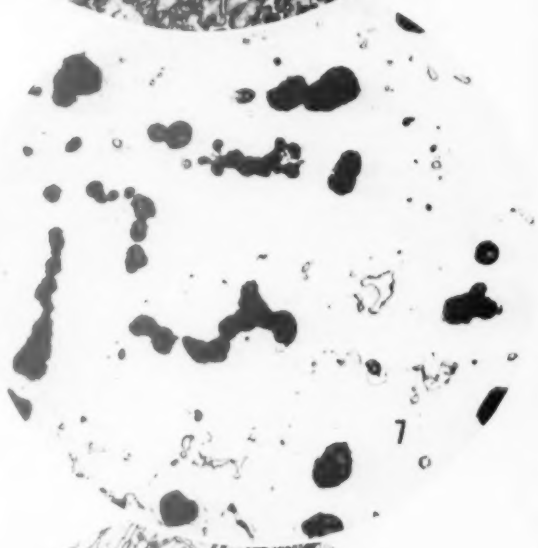


Fig. 5—Effect of casting cross section on graphite flake size in cast iron. A—1½ in., B—1 in., C—¾-in., D—½-in., E—⅜-in., F—¼-in. 100X, picral etch

Fig. 6—Mixed nodular graphite and flake graphite in untreated gray iron, 250X, picral etch

Fig. 7—Magnesium-treated nodular austenitic nickel cast iron. 250X, picral etch

Fig. 8—Acicular gray cast iron, 1 per cent nickel, 1 per cent molybdenum. 250X, picral etch

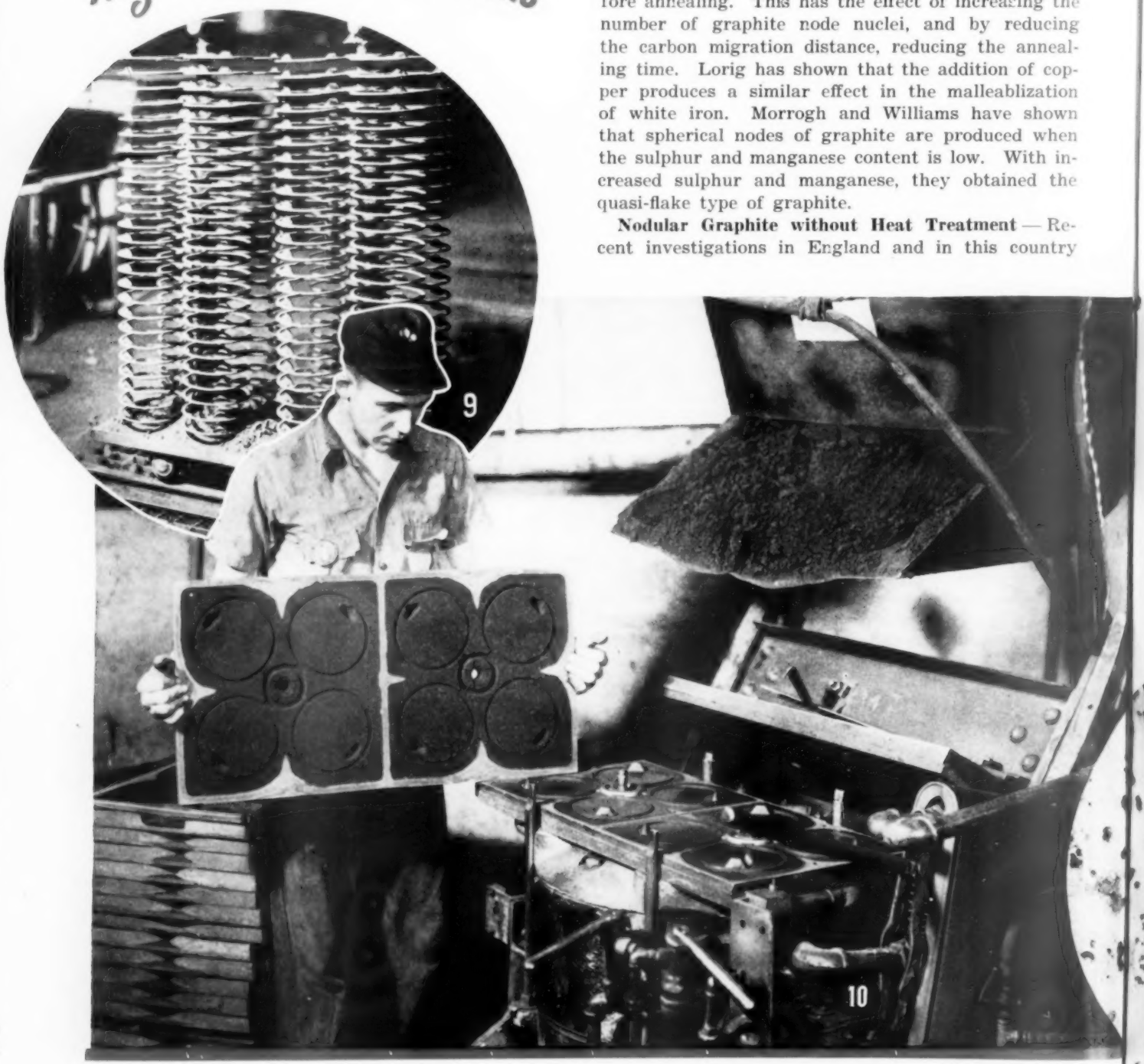
mum obtainable mechanical properties (tensile strength, elastic modulus, etc.) should be those of the steel reduced by the volume percentage of the graphite. Since this condition may be approached only when the graphite is in the form of small, uniformly distributed spheres, it is evident that ordinary gray iron is far from the ideal.

For many years the only practical approach to the problem of obtaining nodular graphite was through the malleabilization of white cast iron. In the malleablization process graphite forms from the carbide by the solution of carbon atoms from the carbide by the austenite and by the migration and precipitation of this carbon on graphite nuclei. Originally a nucleus may be a particle of primary graphite, a small void in the metal, a sulphide inclusion, or any other microscopic or submicroscopic particle which may initiate crystallization of the graphite. Upon this nucleus a radial deposition takes place, building up a nodular crystalline aggregate similar to the "globulite" of the minerologist. The nodule of graphite may be more or less spherical, or it may be shapeless and sprawly, sometimes taking a quasi-flake form.

Considerable study has gone into the control of the numbers of graphite nodes and, consequently, their size. Schwartz has patented the pretreatment of malleable iron by rapidly heating the white iron to above the critical temperature and quenching it before annealing. This has the effect of increasing the number of graphite node nuclei, and by reducing the carbon migration distance, reducing the annealing time. Lorig has shown that the addition of copper produces a similar effect in the malleablization of white iron. Morrogh and Williams have shown that spherical nodes of graphite are produced when the sulphur and manganese content is low. With increased sulphur and manganese, they obtained the quasi-flake type of graphite.

Nodular Graphite without Heat Treatment — Recent investigations in England and in this country

High-Strength Cast Irons



have demonstrated that the nodular form of graphite can be produced directly in the as-cast state. Krynitsky and Saeger reported nodular graphite in induction melted irons in 1942. They melted in a magnesia-lined furnace and intensively superheated before pouring.

An investigation of the methods of production of nodular graphite in nickel, cobalt and iron alloys has been reported by Morrogh and Williams and by Morrogh and Grant of the British Cast Iron Research Association. They were able to promote the formation of the nodular structures by the addition of calcium to the nickel and cobalt alloys and by treatment of low-sulphur irons with cerium. They believed that the nodular structures were promoted by the desulphurizing effect of the cerium addition.

Actually, nodular graphite is not nearly so rare as might be imagined. It is very strange that it was not investigated much earlier. Nodular graphite tendencies are often observed in untreated hypereutectic irons, both cupola and electric furnace melted. Fig. 6 shows a mixed nodular and type D graphite in an untreated electric-furnace-melted iron.

Table II shows typical tensile strengths obtained from cast eutectoid composition steel, gray cast iron, pearlitic malleable cast iron and nodular cast iron, all with equivalent pearlitic matrices.

Ideally, a 2.50 per cent graphitic carbon cast iron, with a perfect graphite distribution, should produce a tensile strength of about 109,000 psi. Neither the pearlitic malleable iron, nor the nodular iron will equal this figure, but they both approach it much more closely than does the gray iron.

Fig. 9—"Tree" of piston rings cast in sand molds

Fig. 10—Method used in making individual castings

Fig. 11—Pre-quenched high-tensile iron with finely divided nodular graphite. 250X, picral etch

Fig. 12—High-tensile iron with large nodular graphite flakes produced without pre-quenching. 250X, picral etch

Fig. 13—Microstructure of pearlitic malleable iron, 250X, picral etch

TABLE I—Properties of Unalloyed Cast Iron

Heat No.	Cross Section Inches Square	Tensile Strength, psi	Hardness, Rockwell B	Secant Elastic Modulus (50% of Breaking Load)
252 A	1½"	19,900	77	6.5×10^6
B	1	20,000	81	6.9×10^6
C	¾	25,000	88	8.3×10^6
D	½	32,100	94	11.5×10^6
E	⅜	35,900	96	12.4×10^6
F	¼	43,900	100	14.9×10^6

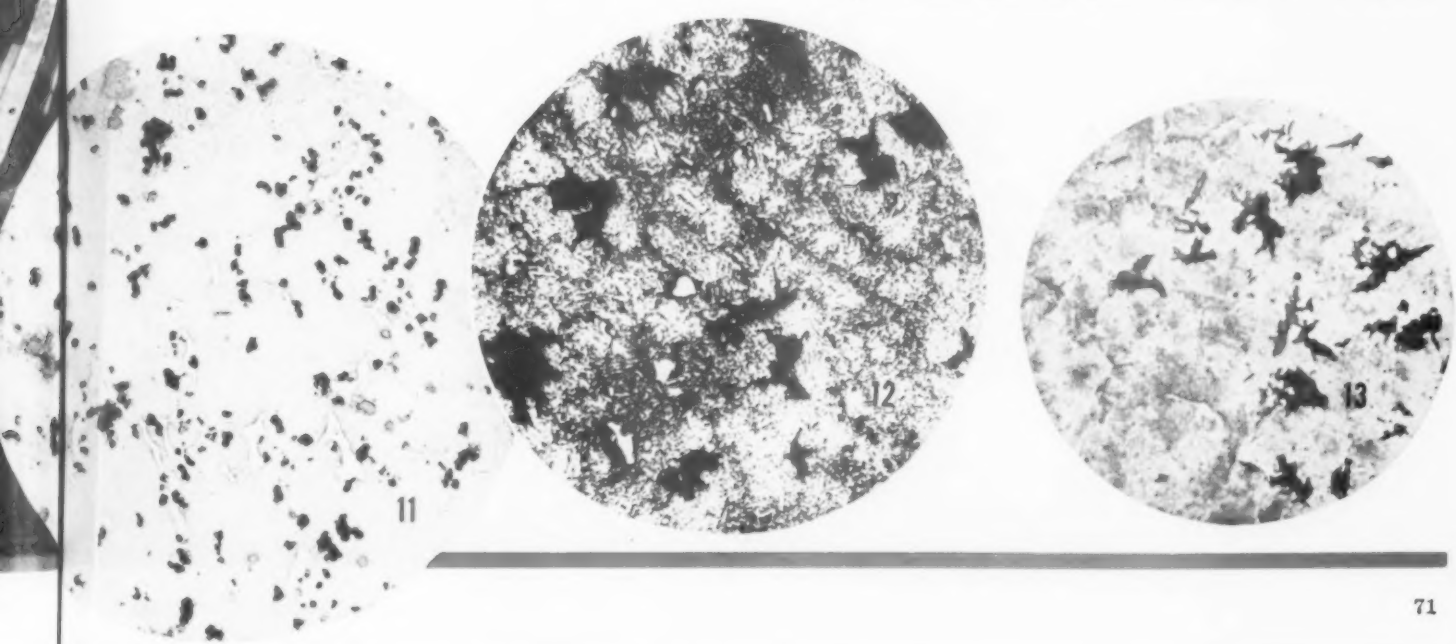
TABLE II—Tensile Strengths of Cast Eutectoid Composition Steel, Gray Iron, Pearlitic Malleable Iron and Nodular Iron, All with Equivalent Pearlitic Matrices

Material	% Graphite by Weight	% Graphite by Volume	Tensile Strength, psi	% Reduction in Strength from that of Steel
0.80% C Steel	0.00	0.00	120,000	00.0
Gray Cast Iron	2.50	8.95	42,000	65.0
Pearlitic Malleable Cast Iron	2.50	8.95	85,000	29.0
Nodular Cast Iron ..	2.50	8.95	85,000	29.0

It should be noted that while the as-cast nodular graphite cast irons are still in the experimental stage, they show considerable promise as low-cost, high-strength materials. They possess advantages in their inherent high fluidity, excellent castability and ease of production. Much basic work is yet to be done on production methods and control of mechanical properties.

The Matrix—So far we have treated on the graphite phase of the various types of cast iron, because the graphite marks the principal difference between cast iron and steel. With slight modification brought about by the presence of relatively large percentages of silicon, sulphur, phosphorus and manganese, and by the intimate content of excess carbon, the cast iron matrix responds to alloying and to heat treatment exactly as steel does.

The alloys may serve a dual purpose in cast iron. They may be added for their effect upon the graphite as well as for their matrix effect. As in steel, alloys are added principally for their effect upon the time-temperature-transformation curves. For economic reasons, it is often desirable to obtain an acicular (bainitic) structure or a martensitic structure in cast iron without heat treatment (Fig. 8). By using deep hardening alloying elements such as molybde-



num, or molybdenum plus nickel or copper, acicular structures may be obtained in sand castings of several inches cross section. High-strength, low-carbon gray cast irons may be made using these alloys to produce tensile strengths of between 70,000 psi and 80,000 psi in the as-cast condition. Impact resistance of the acicular irons is 2 to 4 times greater than that of pearlitic gray cast iron.

Ferrite is often troublesome in the structure of gray iron. It may be eliminated or reduced by the proper balance of the carbon-silicon content and by the addition of nickel and chromium. We have found 1.0 to 1.5 per cent nickel and 0.3 to 0.5 per cent chromium are effective in producing an all-pearlitic matrix in high carbon wear resistant irons.

Copper may also be added for the purpose of reducing the occurrence of ferrite. One of the less commonly known uses of copper in cast iron is to induce low temperature precipitation hardening. Copper cast irons are slightly more corrosion resistant than unalloyed iron.

High-Strength Cast Irons

Fig. 14—Pearlitic malleable iron matrix at 1000X, picral etch

Fig. 15—Centrifugal casting of piston ring iron

Fig. 16—Heat treating department used in partial malleablization of castings

Aluminum must be used very cautiously in cast iron because of its powerful graphitizing effect and aluminum treated castings tend to have gas pinholes. It is used in about 1.0 to 1.5 per cent in nitriding cast iron, and in 4.0 to 6.0 in flame-resistant irons.

Chromium is used to about 2.0 per cent in heavy-section castings for its stabilizing effect on the carbide. And as was mentioned previously, titanium, tellurium and selenium are used for fine-graphite structures in heavy sections. The type D graphite promoted by these last three elements is not objectionable in pressure fittings or mill rolls where the principal considerations are pressure tightness or very smooth machined surfaces.

Boron, vanadium and tungsten have been used in cast iron. Each of these increases the hardness of the iron and improves the strength correspondingly.

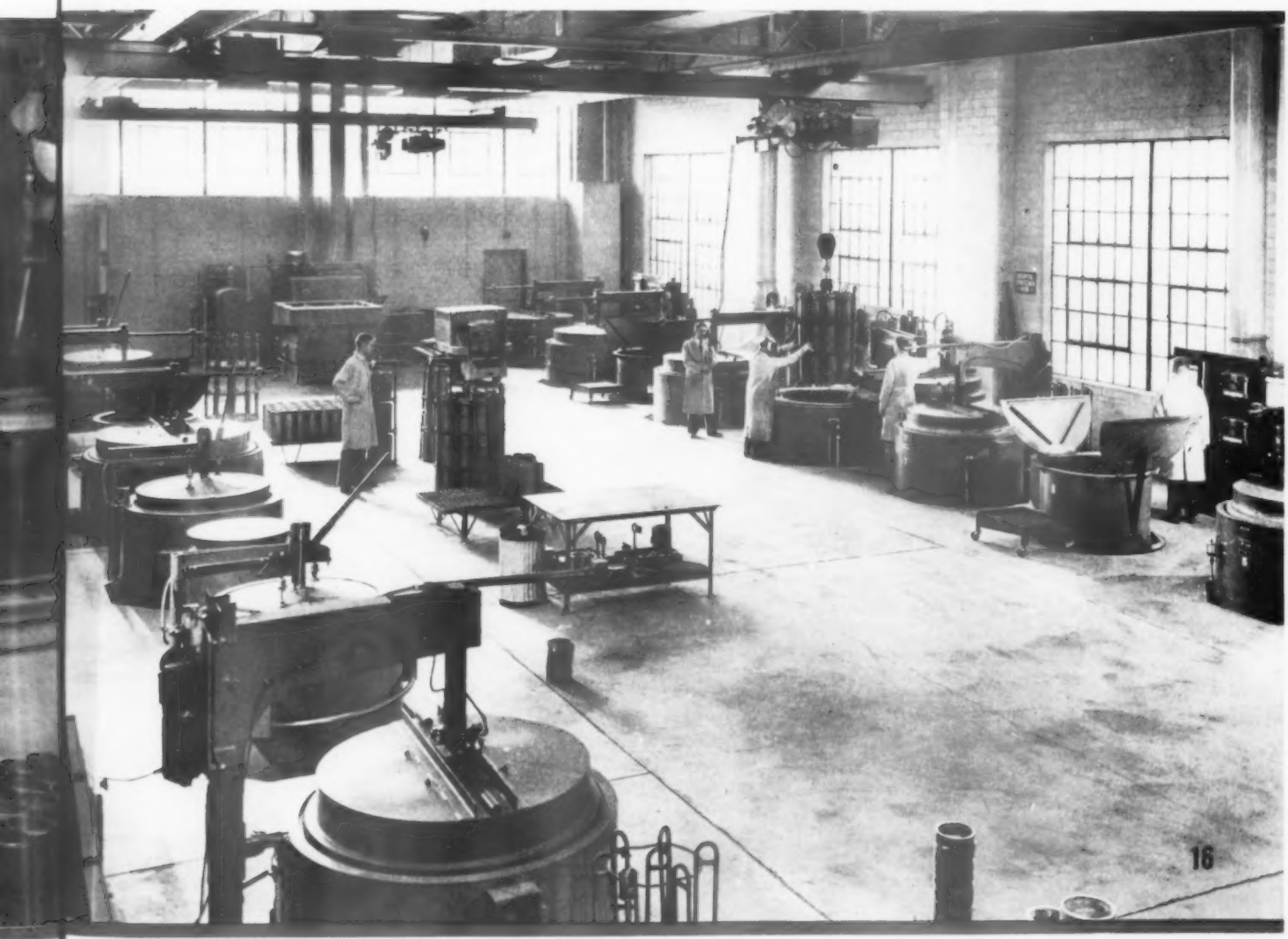
Heat Treatment—The heat treatment of cast iron follows the same general principles as the heat treatment of steel. Several modifications and special effects are possible because of the high carbon content of the iron. It is possible to bring some of the graphitic carbon back into solution by increasing the temperature well above the critical. This may be trapped in the matrix by quenching, producing a hypereutectoid martensitic matrix. This may then be drawn or spheroidized to produce a matrix similar to that of the hypereutectoid steels.

Cast irons ordinarily do not show a definite yield point, but take an increasing set with increasing load, even for small stresses. By quenching and drawing, this set may be decreased and the stiffness of the iron somewhat improved. The quench and draw treatment provides control over the hardness and, as with steel, strength increases as the hardness increases.

Some irons, particularly the acicular irons and the copper alloy irons, respond to precipitation treatment at between 600°F and 1100°F. Improvement in strength is between 10 and 25 per cent without a decrease in transverse deflection or impact resistance.

The pearlitic malleable irons, of course, require heat treatment for graphitizing. Some producers go through a complete malleabilizing cycle and then reheat treat to redissolve carbon and produce a pearlitic or drawn martensitic matrix. More and more foundries are specializing in pearlitic malleable iron and in these it has been found entirely practical to arrest the anneal after completion of the first stage. A pearlitic structure may be obtained by normalizing or by a controlled cooling program.

Many of the steps necessary for production of high strength cast iron mate- (*Please turn to page* 228)



Effect of Final Deoxidation on

Low-Temperature Impact

OF CAST STEELS

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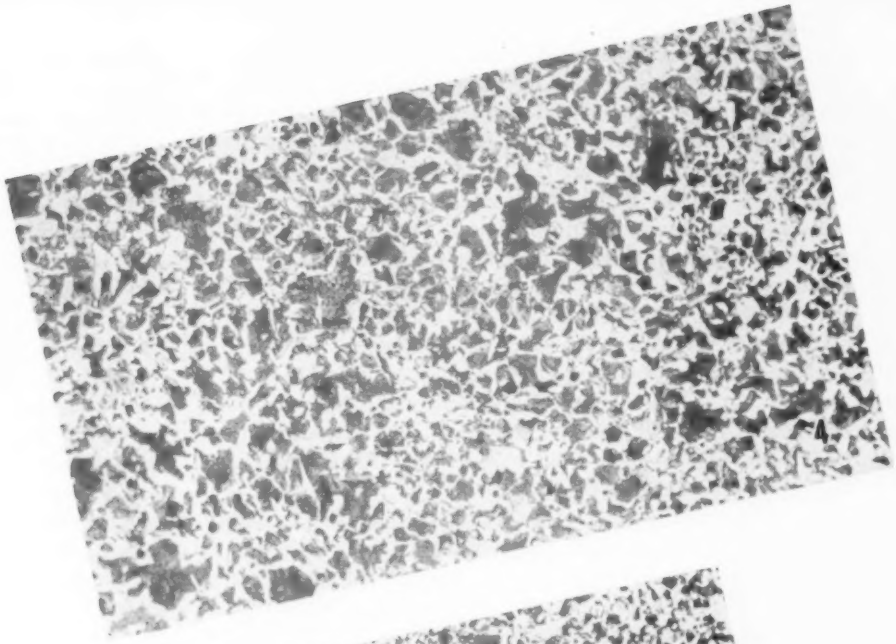
THE specification on cast steel for consistent impact strength at low temperatures, has necessitated changes in deoxidation in order that fine-grained steel can be produced to meet requirements. Changes in practice, including the introduction of more potent deoxidizers, are complicated by the danger of producing inclusion types which will cause low ductility. The present article covers the experimental procedure used by one plant in developing a deoxidation practice which would produce steel castings possessing both good ductility and low temperature impact strength. All of the heats, whether listed as experimental or as production, were of approximately 25 tons in weight and were melted in acid open-hearth furnaces.

Deoxidation of 0.40-0.50 per cent Carbon Steel — One type of casting exhibited erratic notch toughness at −20°F, and investigation indicated that those heats which possessed satisfactory strength at the low temperature were fine grained, whereas those which were unsatisfactory were coarse grained. Standard practice on this grade of steel required a final deoxidation treatment of 4 lb per ton of ferrocarbontitanium (Ti 17 per cent, C 7 per cent, Si 2.65 per cent, Al 1.50 per cent, bal. Fe) added in the ladle. Normal differences in practice apparently caused some variation in the oxygen content of the steel at tap; this resulted in erratic grain size, and consequently erratic low temperature impact strength.

The open-hearth melting practice was surveyed to determine whether heat-to-heat conditions were sufficiently uniform. The usual heat melted in at 0.70-0.80 per cent carbon and was ored down to approximately 0.30 per cent carbon. At this point, standard ferromanganese and 50 per cent ferrosilicon were added simultaneously in sufficient quantities to intro-

ct Strength



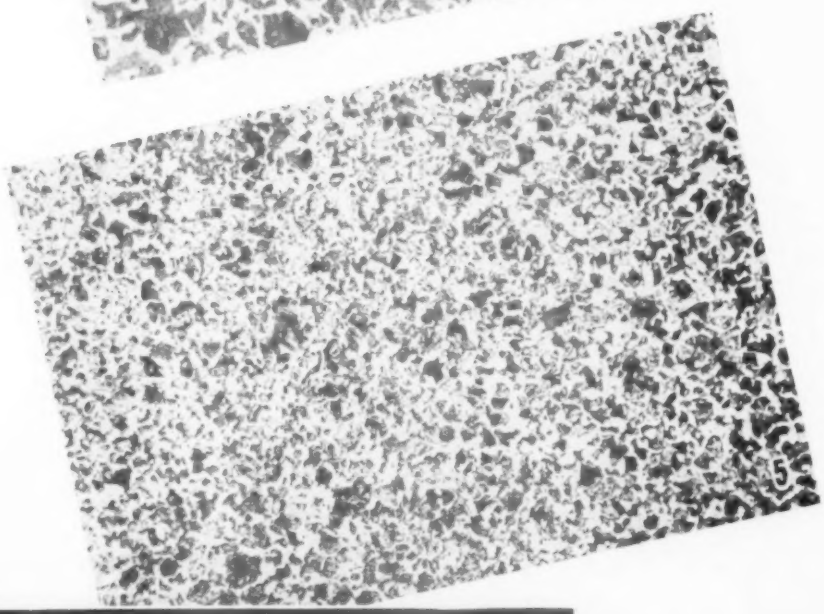


Fig. 1—Microstructure with increased titanium alloy addition shows usual Type I inclusions

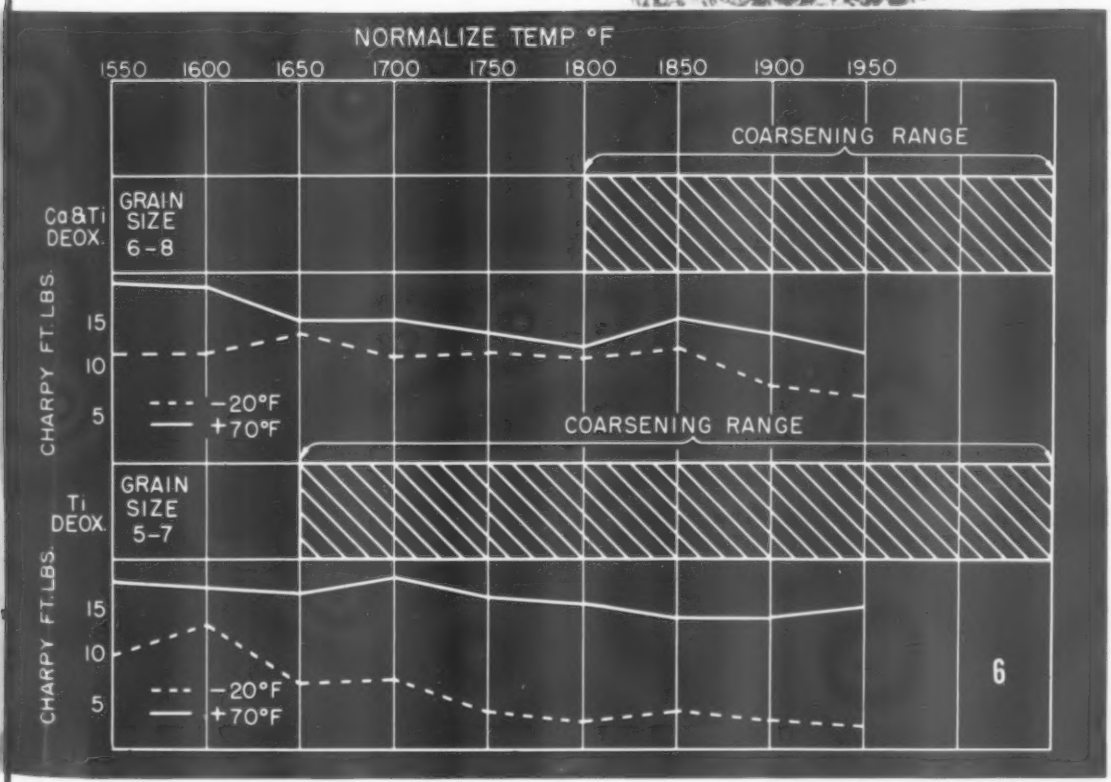
Fig. 2—Intergranular Type II inclusions in heat deoxidized with aluminum

Fig. 3—Type IV inclusions obtained in steels when aluminum used in combination with calcium-manganese-silicon

Fig. 4—Mixed grain resulting from use of ferrocarbon-titanium addition

Fig. 5—Fine grain secured with deoxidation by calcium-manganese-silicon and ferrocarbon titanium

Fig. 6—Chart showing grain coarsening temperatures of steels made by the two different practices



duce approximately 0.84 per cent manganese and 0.32 per cent silicon. The residual manganese at the time of block ranged from 0.02-0.05 per cent and 75 per cent of the manganese added in the furnace was recovered. Heats were tapped in fifteen to twenty minutes after block, depending on the time required to run the last test. Such items as materials charged, type of flame during melt-down, slag control, temperature control, rate of carbon drop, and pouring pit practices were found to be satisfactorily consistent. It appeared necessary to improve ladle deoxidation and a decision was made to experiment with various types and quantities of deoxidizers. All of the 0.40-0.50 per cent carbon steel tests described in the following section were normalized from 1650°F and tempered at 1150°F.

The first approach to the problem was to increase the titanium alloy addition progressively to 8 lb per ton of ferrocarbon-titanium. Results of this series of heats are given in Table III. The larger amounts of titanium alloy were not effective in improving low temperature notch toughness. Ductility remained satisfactory and the usual Type I inclusion which persisted throughout the series is illustrated in Fig. 1.

A more powerful deoxidizer, aluminum, was then tried as a complete and partial substitute for ferrocarbon-titanium and was also used in conjunction with calcium-manganese-silicon (Ca 18 per cent, Mn 15 per cent, Si 55.5 per cent). The results of this series of heats are given in Table IV. The plain aluminum and the aluminum-titanium steels were characterized by fine grain size and satisfactory notch toughness, but static ductility was decreased due to inclusion type. The intergranular Type II inclusions found in these heats are illustrated in Fig. 2. When aluminum was used in combination with calcium-manganese-silicon, both impact strength and ductility were satisfactory. The Type IV inclusions secured on these steels, illustrated in Fig. 3, were not harmful to ductility. Unfortunately, aluminum deoxidation adversely affected the fluidity of the metal and made it difficult to pour. Experiments on the use of this element were discontinued.

Combinations of calcium-manganese-silicon and ferrocarbon-titanium were next tried and preliminary tests indicated that 4 lb per ton of each material produced satisfactory physical properties in the castings. Results of this experimental series of heats are given in Table V.

In production runs of subsequent heats, it was found that this deoxidation practice resulted in occasional heats which contained Type II inclusions and which were characterized by low static ductility. Several changes in shop practice were made to overcome this difficulty. A hopper was constructed so that the deoxidizers could be added to the metal in the spout,

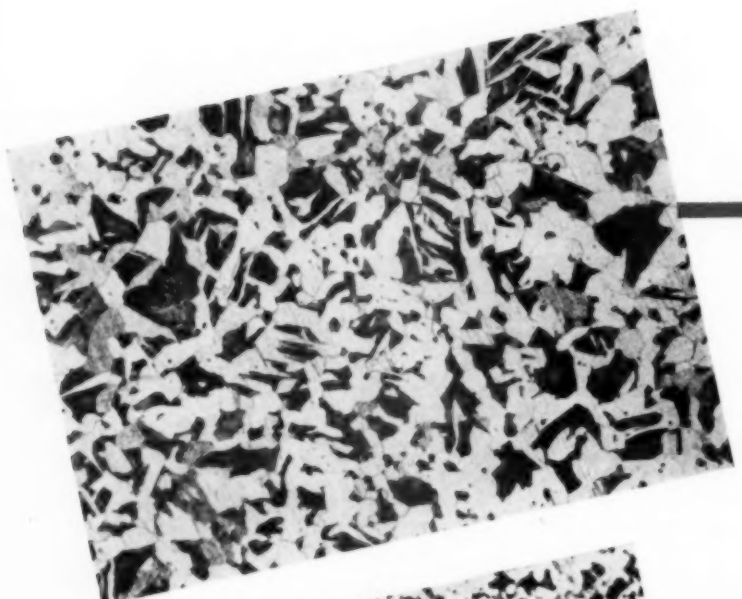


Fig. 7—Typical normalized grain size secured with the old deoxidation practice

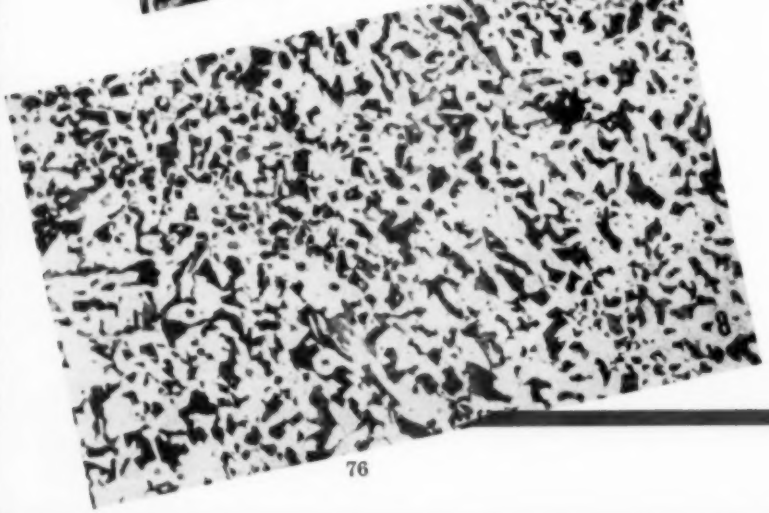


Fig. 8—Representative grain size resulting from the new deoxidation practice

TABLE I—Production Heats—0.40/0.50% Carbon

	Old Practice	New Practice
Number of heats	3	37
Ladle deoxidizer per ton	4 lb FeCTi	4 lb CaMnSi-3 lb FeCTi
Ductility of tensile test		
40-45% R.A.	3	7
35-40% R.A.	0	23
30-35% R.A.	0	7
Impact tests at 70° F		
High—Low	15.0–13.0	18.0–13.0
Average	14.2	15.2
Impact tests at —20° F		
High—Low	5.0–3.0	14.0–6.5
Average	3.6	10.7
Inclusion Type I	All heats	All heats

TABLE II—Production Heats—0.20/0.30% Carbon

	Old Practice	New Practice
Number of heats	14	16
Ladle deoxidizer per ton	None*	4 lb CaMnSi-4 lb FeCTi
Ductility of tensile test		
50-55% R.A.	6	5
45-50% R.A.	8	9
40-45% R.A.	0	2
Impact tests at 70° F		
High—Low	25.0–16.0	28.0–20.0
Average	20.8	23.1
Impacts tests at —20° F		
High—Low	14.5–2.6	21.5–10.0
Average	7.8	15.9
Inclusion Type I	All heats	All heats
Grain Size		
Large	1–3	5–7
Small	3–5	6–8

* Ferrosilicon added in furnace.

and so that all the additions could be completed before the ladle was two-thirds filled. This eliminated any contact of slag and deoxidizers. More effective results were secured when the calcium-manganese-silicon was added ahead of the ferrocarbon-titanium. Occasional heats required extra pig for blocking, and the amount of deoxidizer was adjusted carefully to the total heat weight. After these changes, further experiments with different amounts of the two deoxidizers indicated that the most satisfactory practice involved the addition of 4 lb per ton of calcium-manganese-silicon and 3 lb per ton of ferrocarbon-titanium.

Production heats made by this deoxidation practice possessed consistently satisfactory fine grain, good low temperature impact strength, and suitable static ductility. Results on a series of 37 production heats made by the new practice and three heats deliberately made by the old practice, are contrasted in Table I. Those heats deoxidized only with titanium alloy exhibited slightly higher ductility, but all of those made with calcium alloy and titanium alloy were also satisfactory. Fig. 4 illustrates the characteristic mixed grain obtained by the use of 4 lb per ton of ferrocarbon-titanium. Fig. 5 illustrates the uniformly fine grain secured with the new deoxidation practice of 4 lb per ton of calcium-manganese-silicon and 3 lb per ton of ferrocarbon-titanium. Experience with production heats showed that the addition of calcium-manganese-silicon improved the fluidity of the metal.

Experiments were performed to determine the grain coarsening temperatures of the steels made by the two different practices. The calcium-titanium treated steel was found to have the higher grain coarsening temperature. The normalizing temperature could be raised to 1850°F without sacrificing impact strength, whereas the plain titanium alloy treated steel was coarsened by normalizing in the range of 1650-1700°F. The results of these tests are illustrated in Fig. 6.

During the course of the development work, several deoxidizers other than those already mentioned were tried but were found unsatisfactory for various reasons. The use of low carbon ferrotitanium (Ti 40 per cent, Al 7 per cent, Si 4 per cent, C 0.10 per cent) in quantities of 2 lb per ton and 4 lb per ton provided fairly good low temperature impact strength, but static ductility was unsatisfactory due to the presence of Type II inclusions. The use of 5 lb per ton of silicon-zirconium (Zr 40 per cent, Si 50 per cent, C 0.5 per cent) produced satisfactory physical properties but the normalized grain was too coarse. The use of 4 lb per ton of silicon carbide resulted in a coarse grained steel with unsatisfactory impact strength at −20°F. The combination of 4 lb per ton of silicon carbide and 4 lb per ton of ferrocarbon-titanium produced a rather coarse grain size and difficulty was experienced with erratic recoveries of carbon from the ladle addition.

Deoxidation of 0.20-0.30 per cent Carbon Steel—A specification of 12 ft-lb minimum Charpy at room temperature, and at least 50 per cent of this value at −20°F, necessitated a change in the deoxidation practice for 0.20-0.30 per cent carbon steel castings. Tests on this steel were subjected to normalizing treatment at 1700°F. Regular deoxidation practice consisted only of the use of a silicon block in the furnace; no ladle deoxidizer was added. (*Please turn to page* 179)

TABLE III—Titanium Deoxidation

Ht. No.	Deox. Add. per Ton	Y.P., psi	Ult., psi	R.A., %	El., %	Impact +70	Impact −20	Incl. Type	Grain Size
F-47	4 lb FeCTi	54,000	95,000	39.1	23.0	13.0	3.5–4.1	I	5–7
E-5	5 lb FeCTi	58,000	101,300	39.1	24.0	12.3	3.2–5.0	I	5–8
C-395	6 lb FeCTi	54,600	97,700	37.8	22.0	15.0	3.0–6.0	I	5–7
C-420	7 lb FeCTi	57,000	100,500	41.8	21.5	14.8	3.0–3.0	I	5–7
E-162	8 lb FeCTi	55,000	95,000	40.9	24.5	14.8	4.0–7.5	I	6–7

TABLE IV—Aluminum Deoxidation

Ht. No.	Deox. Add. per Ton	Y.P., psi	Ult., psi	R.A., %	El., %	Impact +70	Impact −20	Incl. Type	Grain Size
E-151	3 lb Al	55,000	95,500	24.0	19.0	14.2	6.5–8.0	II	6–8
C-413	1 lb Al-3 lb FeCTi	54,000	94,000	32.8	22.0	13.1	9.1–11.0	I & II	6–8
D-138	2 lb Al-4 lb FeCTi	53,500	96,500	25.1	18.5	11.9	5.8–6.2	II	6–8
F-17	2 lb Al-4 lb CaMnSi	55,500	96,000	39.1	23.0	13.5	10.0–10.0	IV	7–8
C-374	3 lb Al-3 lb CaMnSi	57,400	98,600	34.2	20.5	14.8	12.8–14.0	IV	6–8
F-10	3 lb Al-4 lb CaMnSi	60,500	100,500	37.5	22.5	13.3	10.5–12.5	IV	6–8

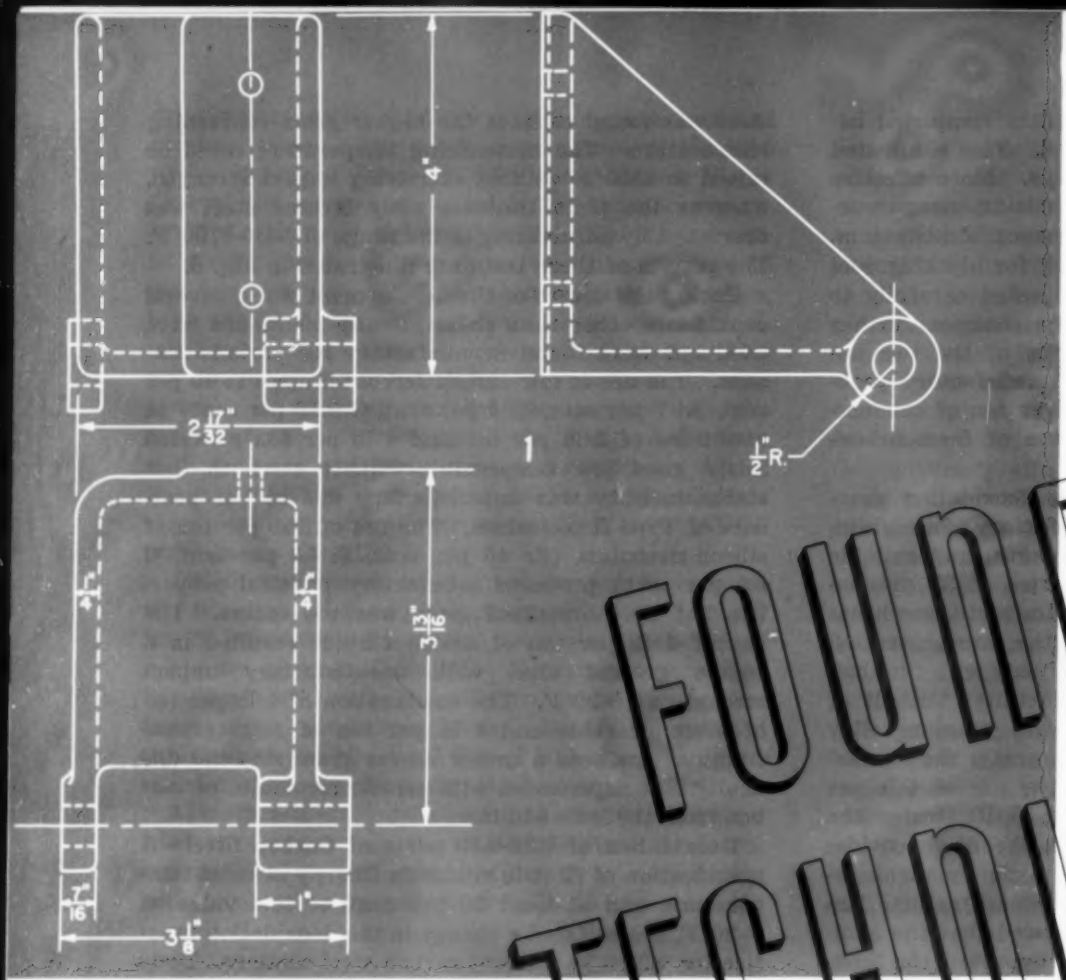
TABLE V—Calcium-Titanium Deoxidation

Ht. No.	Deox. Add. per Ton	Y.P., psi	Ult., psi	R.A., %	El., %	Impact +70	Impact −20	Incl. Type	Grain Size
E-111	3 lb FeCTi-3 lb CaMnSi	57,000	100,500	36.0	22.0	12.0	8.0–8.0	I	5–7
E-131	3 lb FeCTi-3 lb CaMnSi	55,000	98,500	38.5	22.0	14.5	9.2–12.0	I	5–7
C-402	3 lb FeCTi-4 lb CaMnSi	54,500	96,000	40.9	23.0	15.0	8.0–14.0	I	6–7
E-191	4 lb FeCTi-4 lb CaMnSi	60,500	100,000	37.2	23.0	14.0	8.0–8.0	I	6–8
E-202	4 lb FeCTi-4 lb CaMnSi	59,500	99,000	39.7	23.0	16.5	10.5–12.0	I	6–8

TABLE VI—Calcium-Titanium Deoxidation*

Ht. No.	Y.P., psi	Ult., psi	R.A., %	El., %	Impact +70	Impact −20	Incl. Type	Grain Size
D-353	47,600	81,500	53.8	29.0	24.0	16.0–16.5	I	6–8
D-360	44,200	78,500	54.4	30.5	24.0	16.5–18.0	I	5–7
D-367	44,000	78,500	42.4	28.0	24.5	18.0–18.5	I	5–8
H-17	46,300	82,500	45.1	26.0	22.0	14.5–15.0	I	6–8
H-23	44,700	80,500	49.4	30.5	25.0	15.0–16.5	I	5–7
H-32	46,700	81,500	51.1	29.0	24.5	14.0–15.0	I	5–7
H-41	46,000	80,000	50.5	28.0	23.5	15.0–15.5	I	5–7
H-48	47,700	81,000	51.1	30.0	23.0	13.5–15.5	I	6–7
H-54	43,800	79,000	46.0	27.0	25.0	14.0–18.0	I	6–8

* Ladle deoxidation of all heats consisted of 4 lb per ton of calcium-manganese-silicon and 4 lb per ton of ferrocarbon-titanium.



FOUNDRY TECHNIQUES ARE CHALLENGE TO PATTERNMAKER

By FRANK C. CECH
Cleveland Trade School
Cleveland

ADVANCEMENT of the foundry industry is largely dependent upon the skill of the experienced patternmaker," according to J. E. Kolb, general superintendent of the pattern shop, Caterpillar Tractor Co., Peoria, Ill. He has stated further[1] that "a closer relationship between the patternmakers and men in the foundry would make far better qualified patternmakers. This applies primarily to patternmakers who obtained their start in a trade school or a job shop which is somewhat removed from the actual foundry operation. Much can be gained by knowing the requirements of the people who use the equipment made by the patternmaker."

The reader of the foregoing would surmise—and probably justly so—that the average patternmaker has insufficient knowledge of the equipment, operations and techniques of the foundry. It is an indisputable fact that the higher the degree of skill, the longer the patternmaker's experience and the closer his relationship with a foundry, the better he is able to plan pattern equipment. Since the importance of considering the inclusion of foundry methods in planning pattern equipment is recognized and its omission generally conceded, why is this condition allowed to persist?

Is it because the human element, the patternmaker, is not interested in making patterns to fulfill certain necessary requirements? While this inference is made at times, it is not true. Patternmaking, intriguing as it is, attracts an inquisitive, though possibly temperamental, individualist who has an analytical mind and a liking for solving problems that hold his attention. The concentration and patience required in this craft in interpreting blueprints and making the pattern equipment can result only from an interest in the work. The necessity of studying foundry procedures should, if anything, increase the patternmaker's interest in his work—and it actually does. As a personality, therefore, the patternmaker is eliminated as the reason for lack of the foundry consideration in making patterns.

Is it because the pattern buyer refuses to pay the legitimate, though to him a possibly a seemingly unreasonable, price? Or that he lacks specifications

Fig. 1—Sketch of part—a gray iron bracket for a clutch release—which was subject of AFS patternmaking contest in 1948

Fig. 2—Cross section of a follow board with the pattern sunk into it

Fig. 3—Drag when rolled over prior to ramming the cope

Fig. 4—Sketch of pattern shown at right in Fig. 8

Fig. 5—Cross-sectional view of pattern shown in Fig. 4

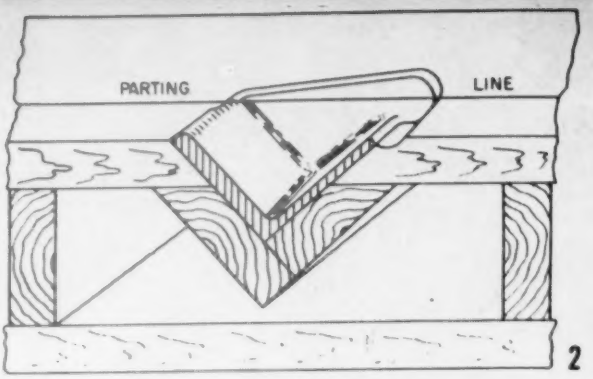
Fig. 6—Most popular choice of pattern construction and molding. Same pattern in cross section shown in Fig. 7

Fig. 8—Patterns mounted on ram-up blocks. One at left is sketched in Figs. 6 and 7

which permit a fair comparison in competitive price quotations? Either of these would result in the acceptance of a lower bid that would not permit proper consideration of the foundry techniques to be followed in the production of a casting. This subject has received much consideration in recent years. Some progress has been made in preparing specifications that would place competitive bidding on a common ground. However, it is not the purpose of this article to solve this particular problem. Is it because the apprentice is poorly trained in the foundry phase of the subject, thereby producing a journeyman patternmaker who is inadequately trained along foundry lines? This can be definitely answered in the affirmative in the majority of cases and is deduced from the following.

If the apprentice is employed in a job shop, the stress in his training will be on pattern and corebox construction and the time consumed in their production. The emphasis will be on a profit margin rather than quality workmanship and foundry consideration. The importance of accuracy is next stressed, as discrepancies in the pattern are multiplied or increased in seriousness in casting production.

The average foundry consideration will consist chiefly of a little draft, core prints, finish metal, and contraction allowances as dictated by his foreman. The why and wherefore is seldom gone into by the apprentice's superior, as it is deemed too costly. While moldability gets little consideration in the field, on the American Foundrymen's Society apprentice contest rating sheet it shares honors with accuracy in being allowed 35 points, compared with 20 points for workmanship and 10 points for time in a total rating of 100 points.



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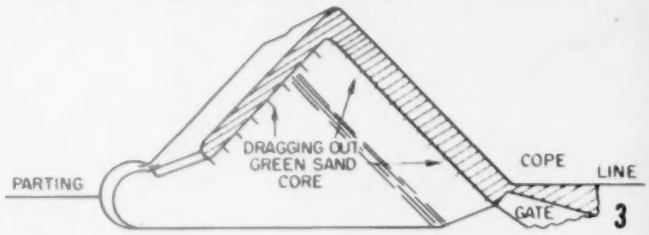

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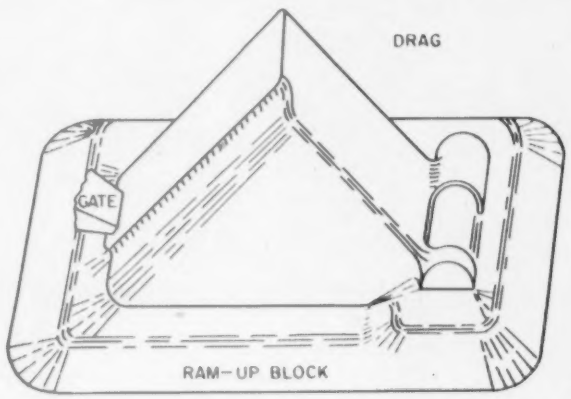

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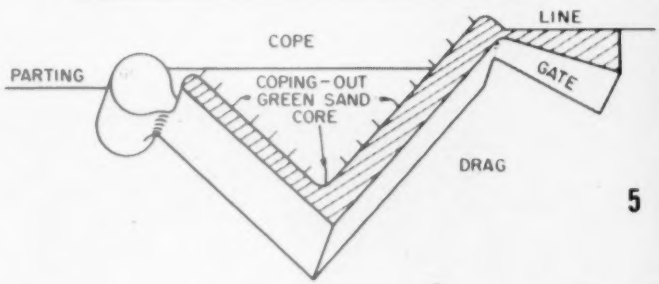

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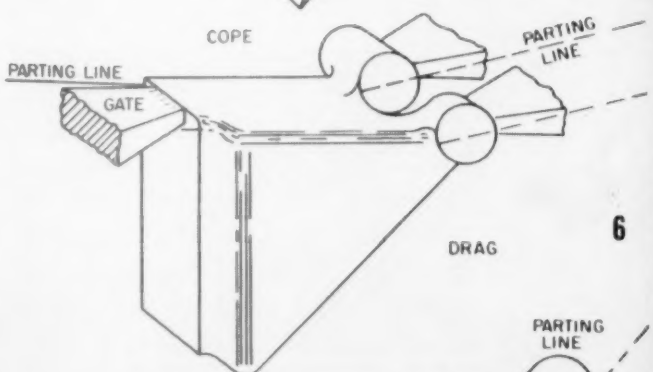

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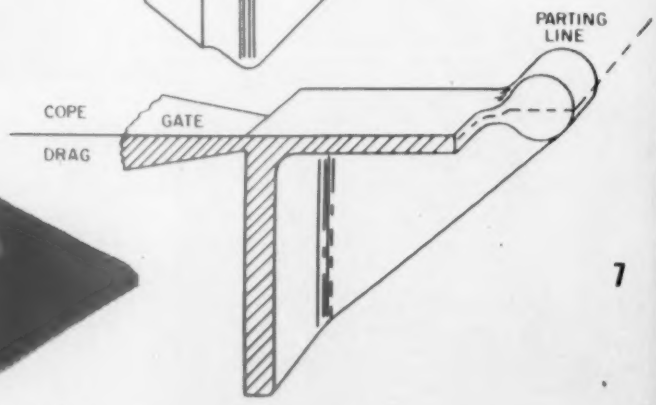

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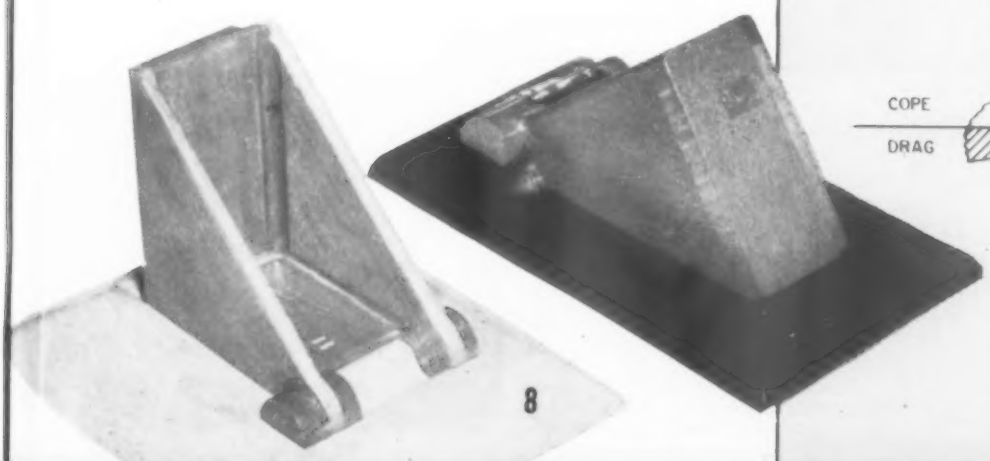
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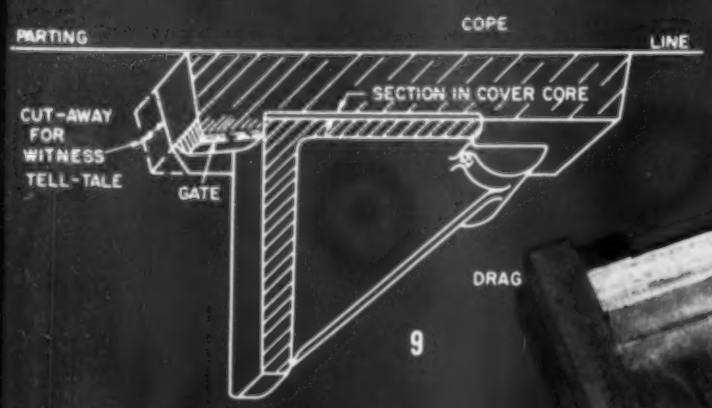
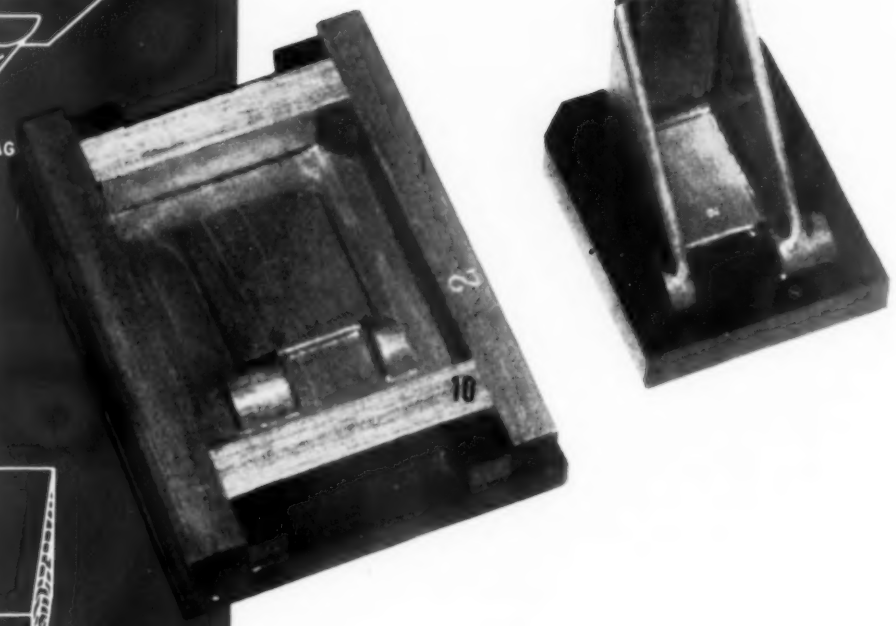
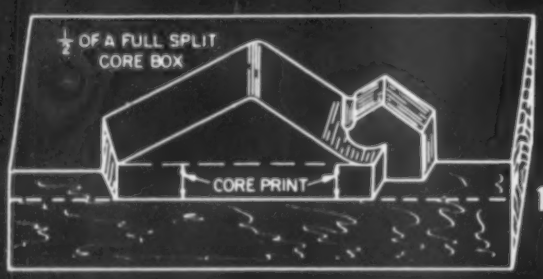




Figs. 9 and 10—Sketch and reproduction of molding method embodying the cover core principle



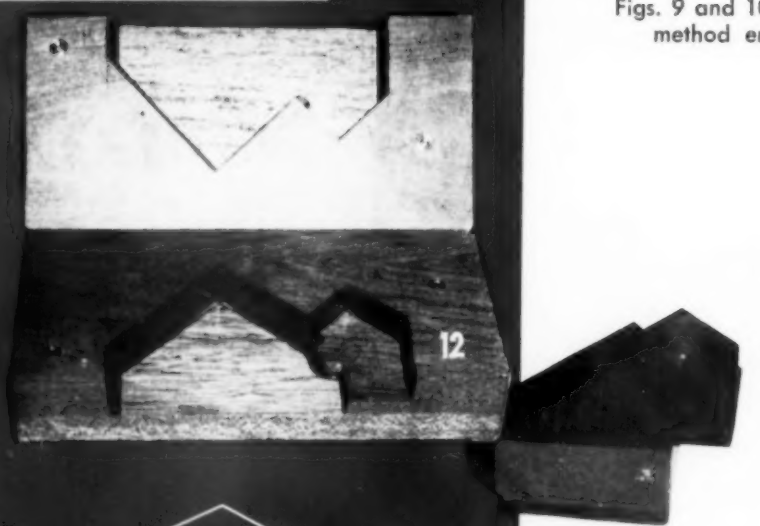


Fig. 11—Sketch of corebox shown in Fig. 12

Fig. 12—Pattern split through the center as shown in parting No. 2 of Fig. 13

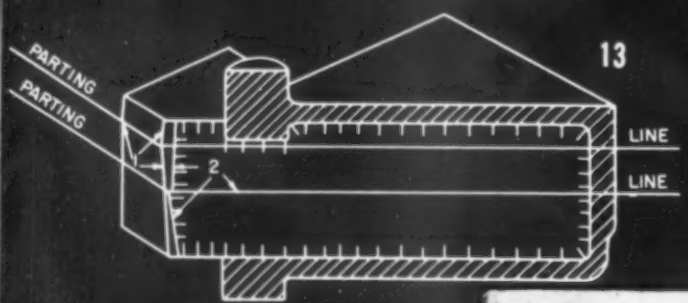
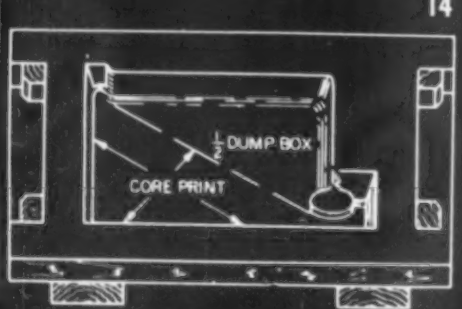
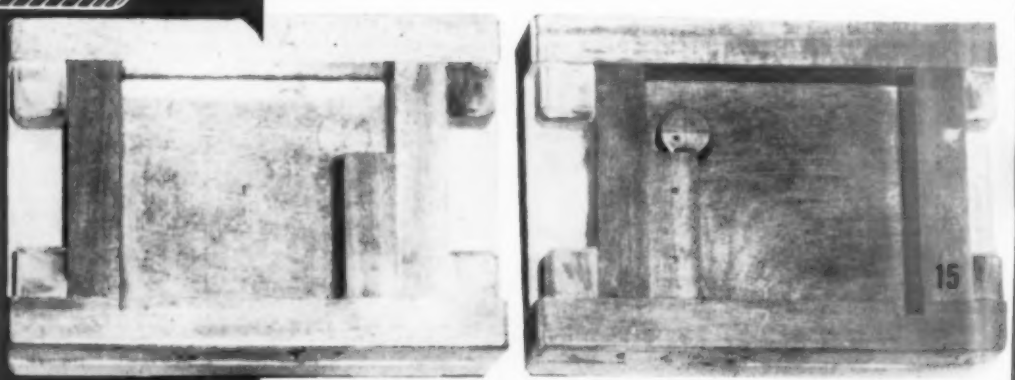


Fig. 13—Illustrating two methods of parting the pattern. No. 1 employs a shallow cope draw, No. 2 an equal cope and drag draw

Fig. 14—Showing construction of corebox pictured at left in Fig. 15





If he is apprenticed to a captive shop, he probably is left to learn by observation the foundry methods as he runs errands about the plant, rather than by directed guidance. What benefit is derived from this type of contact depends in a large measure upon the apprentice's age, his power of observation, his inquisitiveness, forwardness in asking questions and other factors.

Credit must be given to the foundries which make it compulsory for a pattern apprentice to serve time in the foundry and coreroom. This training is a decided help when he is confronted by a blueprint for a pattern offering a number of choices in moldability. A confusion exists in his muddled mind as to which method would be acceptable to the foundryman. This choice of decisions produced a variety of suggested molding methods in the patternmaking contest conducted by the AFS in 1948. The part under consideration is sketched in Fig. 1.

A number of sketches have been prepared to accompany pictures of the patterns and coreboxes submitted in the contest. It is hoped that they will be of some value to the apprentice who is groping about for assistance along these lines. At best the pattern construction and available molding methods presented are subjective, depending on past experience of the patternmaker; and since they are controversial, the writer would appreciate comments from readers.

Fig. 6 shows the pattern as it would appear in the drag of the mold. Fig. 7, a cross section of the pattern in a similar position, reveals the inner part of the pattern. Both of the sketches present the most popular choice of pattern construction and molding. The reasons given for this choice were:

1. A quick method of pattern construction.
2. Makes a neat looking pattern.
3. Is easily checked for accuracy of dimension and workmanship.
4. Gives the molder a choice of several molding possibilities.

The deep draw of the flange would leave a narrow impression that would be difficult to patch should the mold be broken.

Figure 8 shows patterns mounted on ram-up blocks. At left is the pattern sketched in Figs. 6 and 7.

Fig. 4 is a sketch of the pattern pictured at the right in Fig. 8 and also is shown as a cross section in Fig. 5. The method of molding presented here is easy to cope-off and draw as well as to pour. The contestant choosing this method of molding must have had some experience in molding or observation of molding methods.

Fig. 2 presents a cross section of a follow board with the pattern sunk into it. It approximates a molding method common to a sand match, match plate or the cope and drag jobs of high production equipment. It is a molding method and pattern construction that is too costly for a limited run job. The pouring principle is one of feeding or pushing the metal up and over the green sand core, and was frowned at by the judges.

Fig. 3 presents the drag when rolled over prior to ramming the cope. It is in cross section, with the pattern in place. The green sand core over which the metal must be forced corresponds to the inside of the pattern.

All three patterns discussed thus far were of fragile construction. In only one case was this given thought; in that instance the contestant provided a rapping and draw plate (Fig. 8 at right).

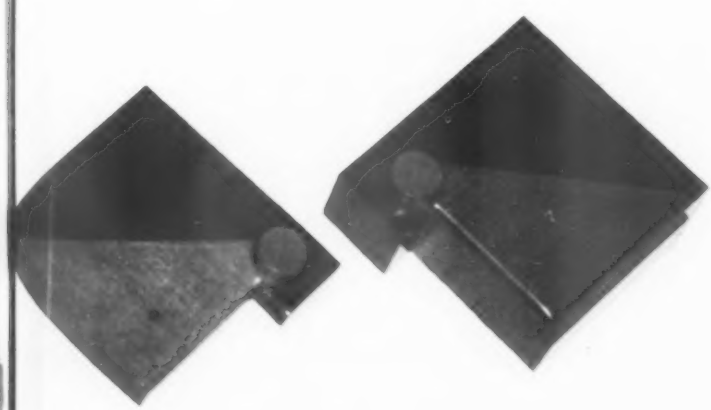
Cover Core Saves Time and Money

Figs. 9 and 10 show a molding method embodying the cover core principle, which saves time and money in many instances. The pattern is of stronger construction being provided a heavy section which may be used in rapping and drawing. The construction is more costly and the molding disadvantages include a blind draw and blind core set, and a core to be made and set. Whether the increased production would compensate for this is problematical in a limited casting order.

Fig. 15, at right, pictures the pattern sketched in Fig 13. The latter presents two methods of parting the pattern. No. 1 favors a shallow cope draw, with No. 2 employing an equal cope and drag draw, although the cope draw becomes deeper. The proponent of the shallow cope draw probably was taught to get as much of a pattern into the drag section of the mold as possible. This principle is rather generally accepted, especially by those with a limited foundry training. The corebox construction is shown in Fig. 14 and should be studied in conjunction with the picture in Fig. 15.

Fig. 12 illustrates a pattern that is split or parted through the center, as in parting No. 2 of Fig. 13. It differs from the pattern shown in Fig. 15 in that it has part of the core print cut down. Whether this core print will be sufficient to carry the core is difficult to determine from the illustrations. The corebox seen in Fig. 12 is sketched in Fig. 11. The corebox is a full-split booking type. Some foundries would object to booking a core of this type. One of the first steps in preparing new equipment such as this would be to remove the male dowel pins and change the corebox to two one-half dump boxes. For a limited run this would solve the problem of bedding in the cores or furnishing driers.

The contest in which the discussed patterns were involved might be briefly summarized as follows. The time taken to complete the patterns varied from an even 10 to 13½ hours. (*Please turn to page* 226)



By TOM BARLOW
and C. P. LOUCKS
Eastern Clay Products Inc.
Jackson, O.

EFFECT OF Cellulose ON FOUNDRY S

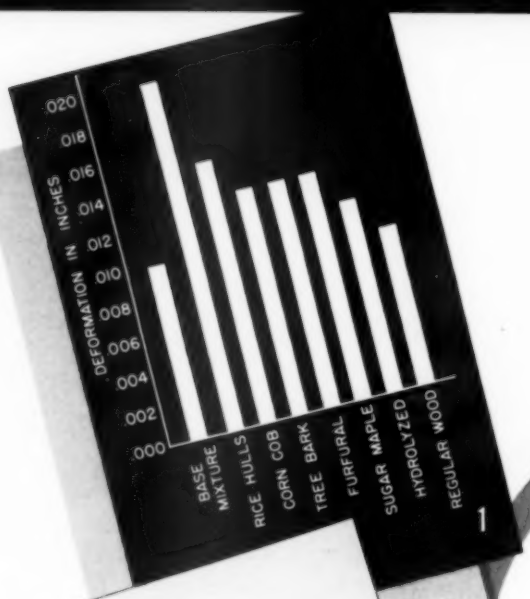


Fig. 1—Effect of cellulose materials on green deformation of molding sand

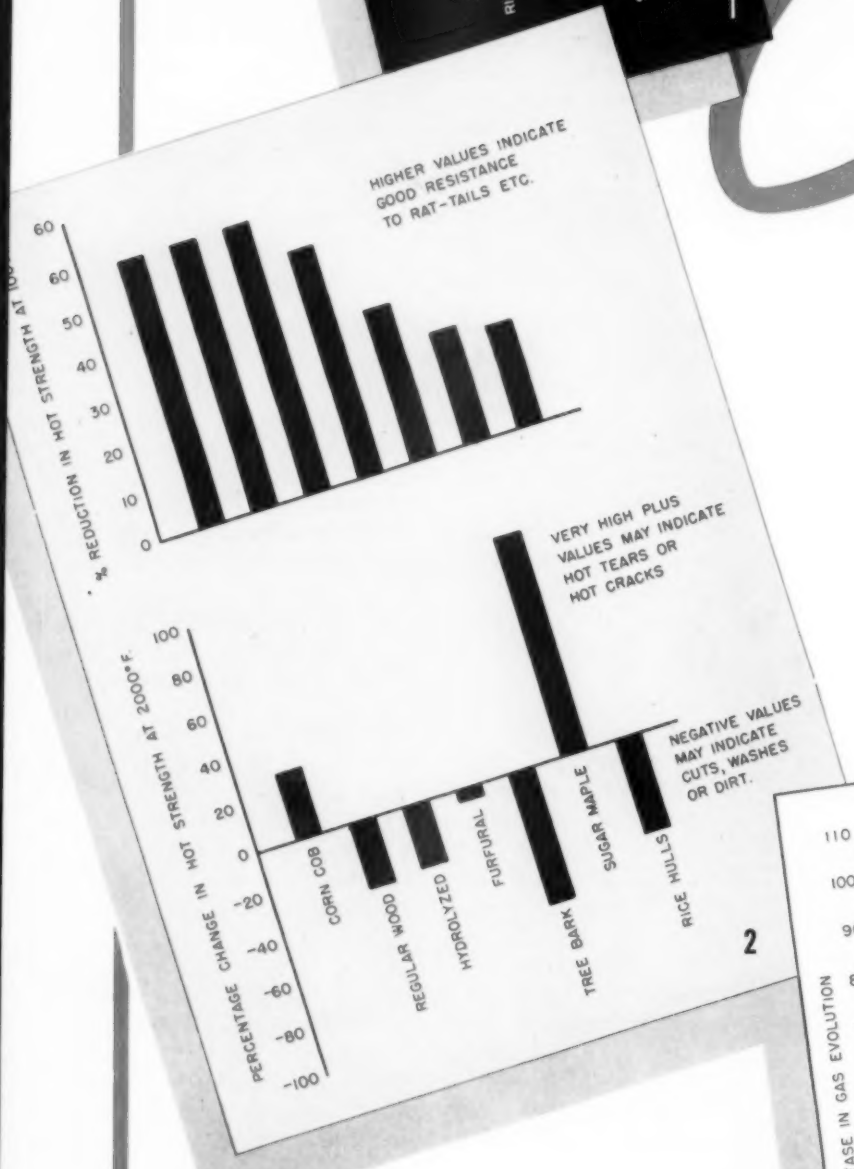


Fig. 2—Effect of cellulose materials on hot strength of synthetic sands

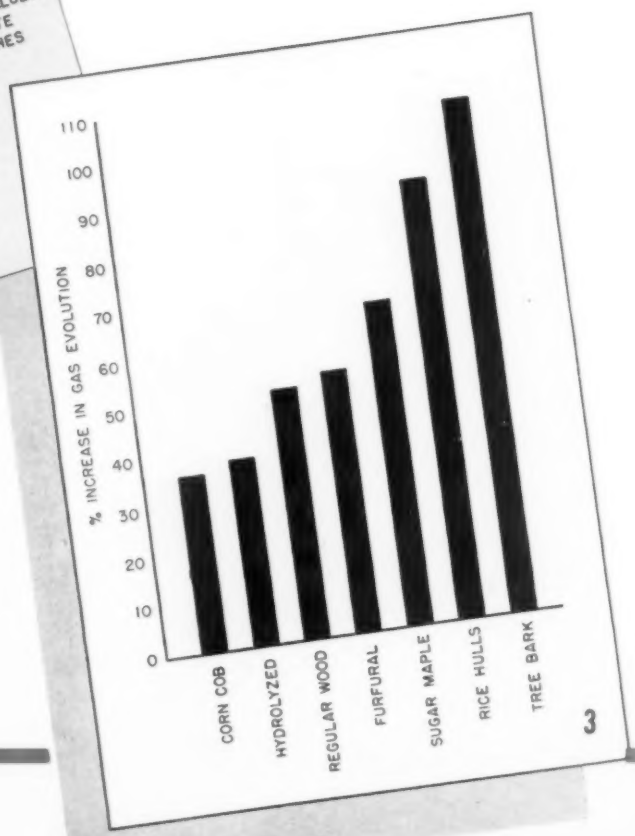


Fig. 3—Relative gas evolution of cellulose materials added to synthetic sands

Cellulose Materials in Oil SANDS

WOOD flour and other cellulose materials are added to synthetic sand to eliminate defects such as rat-tails, buckles, scabs and hot tears. In some applications cellulose will eliminate defects more quickly and economically than any other sand technique. However, there appears to be a wide divergence of opinion as to why and when these materials are effective.

For example, it has been stated that wood flour and other cellulose flours eliminate expansion in molding sands. Presumably this opinion arises from the fact that wood flour does reduce or eliminate defects such as rat-tails, buckles and scabs. These defects are loosely referred to as expansion defects. Actually, such defects are related to extremely intricate time, temperature, strength, expansion and contraction relationships. These relationships have proved to be too complicated for correct and concise evaluation. However, it would seem obvious that 1 per cent of cellulose could not burn out sufficiently to completely offset a 4 per cent expansion of silica grains.

To determine the effect of cellulose materials upon molding sand and the resulting castings, studies were undertaken by Battelle Memorial Institute, Columbus, O., and Harry W. Dietert Co., Detroit. Data developed in these studies are presented in this discussion.

What is the effect of cellulose materials on various sand properties? For the purpose of this study, we chose seven cellulose materials, representing both commercial and noncommercial cellulose flours that could be or are being used by the foundry industry. These materials are identified as follows:

Regular Wood Flour. This was a commercial product typical of the less expensive grades of wood flour produced from mixed woods.

Sugar Maple Flour. This material is commercially available and is considered to differ from other wood flours because it is produced from sugar maple. This flour has the greatest effect on hot strength, probably because of the retained sugar content.

Hydrolyzed Wood Flour. This material is produced by high temperature hydrolysis of wood. It contains a much higher lignin content than ordinary wood flour.

Furfural Residue. In the manufacture of furfural from rice hulls, oat hulls or similar cereals, a partially carbonized residue is available. It is a fairly pure form of cellulose except for the concentration of sulphuric acid inherent to the manufacturing process. The amount of sulphuric acid may or may not be sufficient to promote corrosive attack on mixing and handling equipment.

Rice Hulls. The hulls remaining after the processing of rice could be pulverized to supply a cellulose material for foundry use. However, the material is available only during the rather short milling season of rice and, therefore, has not been promoted commercially.

Tree Bark Flour. Various powdered bark flours are produced, principally in the Northwest. The most desirable grade for foundry use seems to be a mixture of bark constituents.

Corn Cob Flour. This newly available material consists of pulverized corn cobs. Clean cobs are dried and reduced in size by a combination of crushing and tearing equipment, followed by a high speed separation to remove silicious material. Further air separation removes a portion of the structure which would normally contribute to acrid fumes. Final sizing is carried out in crushing and grinding equipment. A relatively coarse grind has been found to be most effective.

Test Results on Synthetic Molding Sand—Table I summarizes the test results obtained when cellulose materials are added to a typical synthetic molding sand. The properties studied include green strength, permeability, deformation, hot strength, expansion and gas evolution. Of these, the most important from the standpoint of casting defects are deformation, hot strength and gas evolution. These important properties are illustrated in Figs. 1, 2 and 3.

Green Strength. Cellulose materials are not added

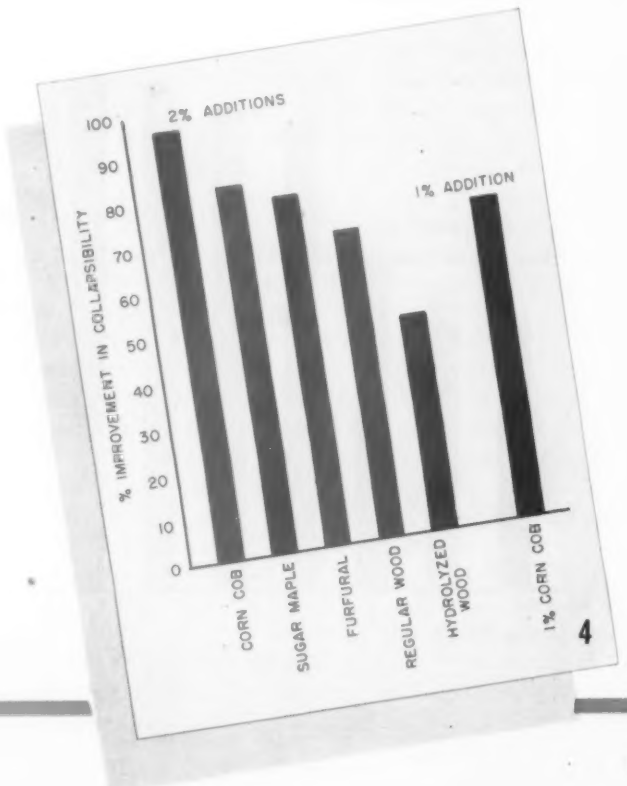


Fig. 4—Effect of cellulose materials on collapsibility of oil sand cores

TABLE 1—Test Results Covering Eight Mixes Comparing Seven Different Cellulose Addition Materials

	% Tempering Water	Green Compression Strength (Lb)	Green Permeability	Green Deformation (In.)	Hot Strength (Lb) 1000° F	Hot Strength (Lb) 2000° F	Confined Expansion In./In. 1500° F	Gas Volume cc/g Sand	Weight of Flour Per Cu Ft
1. Standard Mix—No Flour for Comparison	3	6.8	194	.010	139	162	.036	329	
2. Corn Cob Flour	3	6.1	174	.015	56	212	.039	450	14.4
3. Regular Wood Flour	3½	10.9	164	.009	55	111	.042	500	15.8
4. Sugar Maple Flour	3½	6.7	168	.013	104	321	.037	550	13.9
5. Hydrolyzed Wood Flour	3½	9.4	164	.011	55	111	.040	458	18.1
6. Furfural Residue	3¾	7.1	187	.013	68	152	.041	508	31.5
7. Rice Hulls	3½	6.3	161	.020	107	95	.040	625	24.7
8. Tree Bark Flour	3½	6.8	171	.013	92	68	.043	675	22.6

5 per cent western bentonite was mixed with 95 per cent silica sand and tempered with 3 per cent water. One per cent of each flour was then added and tempered to same feel as the standard comparative mix.

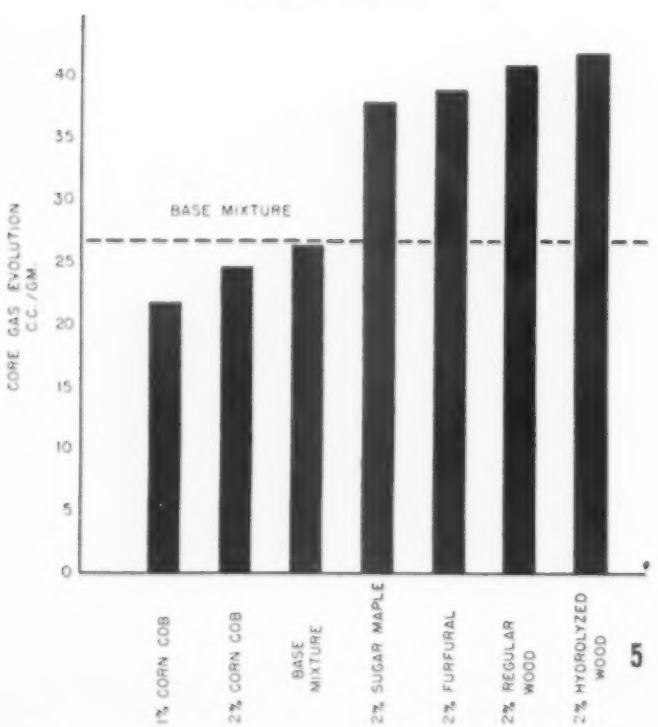
to synthetic sands for the purpose of improving the green strength since additions of bentonite or other bond clay are far more economical. Table I indicates that the regular wood flour and the hydrolyzed wood flour increase green compression to some extent. Other additions had practically no effect. The increase in green strength caused by regular and hydrolyzed types is related directly to the lignin content.

Permeability. As might be expected, all cellulose additions reduced the permeability but the reduction was such as to be insignificant in most applications.

Deformation. As shown in Fig. 1, all of the cellulose additions caused some improvement in deformation except regular wood flour, which gave a mild reduction. The greatest improvement came from the addition of rice hull flour. Corn cob flour increased deformation approximately 50 per cent while most of the others showed improvements of approximately 20-25 per cent.

Confined Expansion. Contrary to general belief, all cellulose additions increased the confined expansion. Therefore, the effect of wood flour on rat-tails and other "expansion" defects can not be through "controlling expansion."

Fig. 5—Gas evolution from oil sand cores containing cellulose additions



Hot Strength at 1000° *F.* Recent work by the AFS Committee on Physical Properties of Iron Foundry Molding Materials at Elevated Temperature indicates that the effect of cellulose material on the hot strength measured at 1000° is closely related to rat-tails, buckles and scabs. This committee points out that a reduction in confined expansion is also important but few materials reduce this expansion. Therefore, the foundryman must rely primarily on controlling the hot strength at 1000° F. As shown in Fig. 2, all of the cellulose materials tested had the desirable effect of reducing hot strength at 1000° F. Corn cob flour, regular wood flour and hydrolyzed wood flour gave a 60 per cent reduction in hot strength, while the other materials tested ranged down to a 20 per cent reduction in the case of rice hull flour.

Since reduction in hot strength of 1000° F is the key to the success of cellulose materials, it should be discussed in somewhat greater detail. One factor that has not had its proper share of discussion is the effect of such materials on hot strength at 2000° F. If a material is added to molding sand for the purpose of reducing the hot strength at 1000° F, it will also have an effect at other temperatures. Hot strength at 2000° F is related to cuts, washes and dirt.

The lower portion of Fig. 2 illustrates the effect of cellulose materials on hot strength at 2000° F and, therefore, upon the tendency toward cuts, washes, dirt and hot cracks. This graph illustrates the unusual effect of sugar maple flour as compared with the other materials, most of which reduced hot strength. The lower and upper graphs together provide an indication of the relative properties of materials tested. For example, it would not seem desirable to use sugar maple flour for controlling defects in light castings since the percentage reduction in strength at 1000° F is relatively small, while the increase in hot strength at 2000° F is great. The result might be a relatively poor control over rat-tailing and buckling, plus a tendency for hot cracks and tears. On the other hand, if materials such as regular wood flour, hydrolyzed wood flour, bark flour and rice hull flour were used for relatively large castings, the elimination of buckling might be offset by an increase in cuts, (*Please turn to page* 243)

Educational Programs

By JAMES H. SMITH
General Manager
Central Foundry Division
General Motors Corp.
Saginaw, Mich.

Three programs which, the author declares, will comprise a major step in enlarging the market for castings are discussed here. This paper was presented before the semiannual meeting of the Malleable Founders' Society at Cleveland, Jan. 14

MANY foundrymen realize that their industry is losing considerable business to other materials, such as forgings, stampings, steel weldments, etc. As time goes on it will become more apparent that the long-range perspective for our industry is not reassuring. I am not by nature a pessimist, but I do believe we should acknowledge irrefutable facts, analyze our problem thoroughly, and lay plans for counteracting a trend which is seriously threatening our pocketbooks.

For a good example of what I am talking about—this year, one large automobile manufacturer is changing over from a cast gray iron shock absorber body to a welded pressed steel body. This change alone will result in the loss of about 12,000 tons a year of gray iron business.

On certain makes of 1949 model passenger cars, the body hinges, which were previously castings, are now forgings, stampings, and rolled steel sections. This change resulted in a loss of about 4000 tons per year to the foundry industry.

Now I know this raises the question—why do we find ourselves in this position? Here, I think, are some of the reasons:

During the war years, the foundry industry had a high loss of technical and supervisory personnel to the armed forces and other industries, and much of this loss has not been recovered. Also the industry, which was more or less a low-paid industry previous to the war, had some very substantial wage increases, which of course have carried over into the postwar period. During the war, many foundries sought to reduce their labor turnover by relaxing discipline in the shop. The benefit to the turnover was questionable, but certainly efficiency and cost suffered and the postwar climb back has been difficult and slow.

Now, there are a few things which have happened since the war which have affected us. The quality of our basic materials, such as coke and pig iron, has been very poor and has tended to increase costs. I can recall that back around 1941 we were able to produce iron at the spout for less than $20 a ton. Today I imagine $60 is a low figure.

There has been a very high demand for castings and foundries, up to this point, have been able to choose pretty much what they wanted to make. Also, selling prices have been high and in many instances foundries have not concentrated on cost reductions to anywhere near the extent that they should. In addition, customers have been more tolerant in their inspection standards than previous to the war; in some instances this has resulted in a poorer quality product.

We cannot shut our eyes to the fact that producers of competitive materials have been very aggressive in promoting the use of their products. Through carefully planned promotional and educational programs, they are influencing many of our customers and potential customers to use their products. The result of all this, as previously mentioned, is the loss of business to other materials.

Foundry educational programs, to my mind, will be one of the major steps in recovering and enlarging the market for our castings. These programs can be covered under three headings, namely:

1. To acquaint more students in the engineering schools of the advantages of using cast materials by getting the schools to include foundry educational programs as part of their curriculum.

2. To build up our supervisory personnel by encouraging better trained young men to come into the industry and to give further training to the supervisors we now have.

3. To attract young engineers into the industry to speed up the development of the many projects we should be working at vigorously to keep abreast of competing industries.

These items are not intended to give the impression that I am advocating running all of our plants with engineers or highly trained technical men. The people we have in the industry today are doing an excellent job, and I am sure will continue to do so. I personally do not have a college background nor am I an engineer, but I do realize that if we are to make satisfactory progress in the future, we (*Please turn to page* 182)

THOMAS H. SHARTLE
President

G. CLYMER BROOKE
Vice President

Annual meeting

STEEL

CONSIDERATION of the problems of product development, market extension, research, safety, and the general business and raw material outlook for 1949 featured the annual meeting of the Steel Founders' Society of America, held at the Edgewater Beach Hotel, Chicago, Feb. 9-10. Thomas H. Shartle, president, Texas Electric Steel Castings Co., Houston, Texas, and the newly elected president of the society, presided.

In his opening remarks, President Shartle stressed the value of the society's research reports as a tool for increasing profits. Preparation of these reports has been guided by the best talent in the steel castings industry. Utilization of the material which already has been made available and the research reports which are to follow, will help to increase the quality of the product, reduce production costs, and increase the fund of fundamental information on cast steel available to the buyer. Mr. Shartle quoted from a number of letters which testified to the savings that have been secured in a number of individual foundries through the application of the society's research information in production. C. L. Heater, vice president, American Steel Foundries, Chicago, and chairman of the Technical Research Committee, stressed the importance to the steel castings industry of the information being developed under the research program. He stated that he knew of no other research program where so much has been delivered for so low an expenditure of funds.

F. Kermit Donaldson, retiring president of the society, praised the exceptional co-operative work of the various society committees during the past year. He reported that the first industrial relations conference, held in St. Louis in September, was one of the most successful of any meetings in the history

F. KERMIT DONALDSON, awarded the Lorenz Medal, Steel Founders' Society of America, formerly was vice president-general manager, Machined Steel Casting Co., Alliance, O. Mr. Donaldson was born and educated in Alliance, and studied chemistry and metallurgy at night school and by correspondence. He entered the Alliance plant of American Steel Foundries, Chicago, in 1916, and three years later, when Machined Steel Casting Co. was organized in Alliance, he became associated with the company and served subsequently as draftsman, chemist, inspector, assistant sales manager, general superintendent, and vice president-general manager. For many years active in affairs of the organization, Mr. Donaldson was a director of the Steel Founders' Society from 1940-1944, vice president 1944-45, and served as its president last year. As of Apr. 1, Mr. Donaldson became executive vice president-secretary of Steel Founders' Society, relinquishing his connection with Machined Steel Casting Co.

F. KERMIT DONALDSON
Lorenz Medalist

By FRANK G. STEINEBACH
and WILLIAM G. GUDE
THE FOUNDRY

held by FOUNDERS' SOCIETY

of the society, and that sessions of the T & O groups, including the annual conference held in Cleveland last June, have been of exceptional importance. He reported on the establishment of the Foundry Advisory Committee and sub-committees to the Munitions Board of the Military Establishment. Mr. Donaldson also discussed the progress which has been made by the society.

Leslie C. Thellemann, executive vice president of the society, reported on the growth in society membership and outlined briefly the wide variety of committee activities promulgated during the year. He stated that the society recently joined the Foundry Educational Foundation as a founding member. Mr. Thellemann also stressed the importance of the industrial relations conference held last year, and stated the 1949 conference would be held at the Drake, Chicago, June 9-10. He announced the scrap drive now being sponsored by the Department of Commerce, and indicated that those in charge in Washington believe firmly that the drive is essential if foundries and steel mills are to have an adequate supply of ferrous scrap in the months ahead.

Charles W. Briggs, technical and research director of the society, reported the research program is moving forward at an accelerated pace. During the past year the society published five research reports covering the following subjects: Weldability of Carbon-Manganese Steels; Reproducibility of Results of Tensile Tests on Specimens Prepared from Cast Steel Coupons; Surface Finish of Steel Castings; Dendritic Structures and As-Cast Structures of Cast Steels; and Pressure Feeding of Steel Castings at Pressures Higher than Atmospheric. The following studies are being given special attention at the moment: Fluid Flow of Steel; Evaluation of Pipe Eliminators; Reclamation of Expended Foundry Sands; and Types of Molding Material Mediums.

Mr. Briggs stated that during the coming year, a revision of the *Steel Casting Handbook* will be undertaken and that the Technical Research Committee will work closely with the Product Development Committee in developing information on tolerances, welding specifications, standard quality specifications, and standard coupon specifications. He stated that the annual T & O conference will be held in September.

William J. Phillips, product development director of the society, indicated that there is a vast difference in the magnitude of the market for steel castings produced as such, and those produced and sold as engineered parts. (*Please turn to page* 245)

ROY A. GEZELIUS
T & O Medalist

ROY A. GEZELIUS, awarded the Technical and Operating Medal of the Steel Founders' Society of America, is assistant works manager and chief metallurgist, General Steel Castings Corp., Eddystone, Pa. A native of LaGrange, Ill., Mr. Gezelius attended school there and received degrees in industrial chemistry and metallurgy from Michigan State College. He became associated with Naval Research Laboratory, Washington, in 1929, where he was engaged in various types of experimental work on steel castings. He was metallurgist, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., from 1938 to 1940, when he joined General Steel Castings Corp. During the war Mr. Gezelius was chairman of the Cast Armor Committee, Army Ordnance, and currently is vice chairman of the Ordnance committee concerned with all types of armor. At the conclusion of the war he made a government-sponsored study of the German steel castings industry. Mr. Gezelius is a member of the Technical Research Committee of the Steel Founders' Society.

By WILLIAM G. GUDE
Managing Editor
THE FOUNDRY

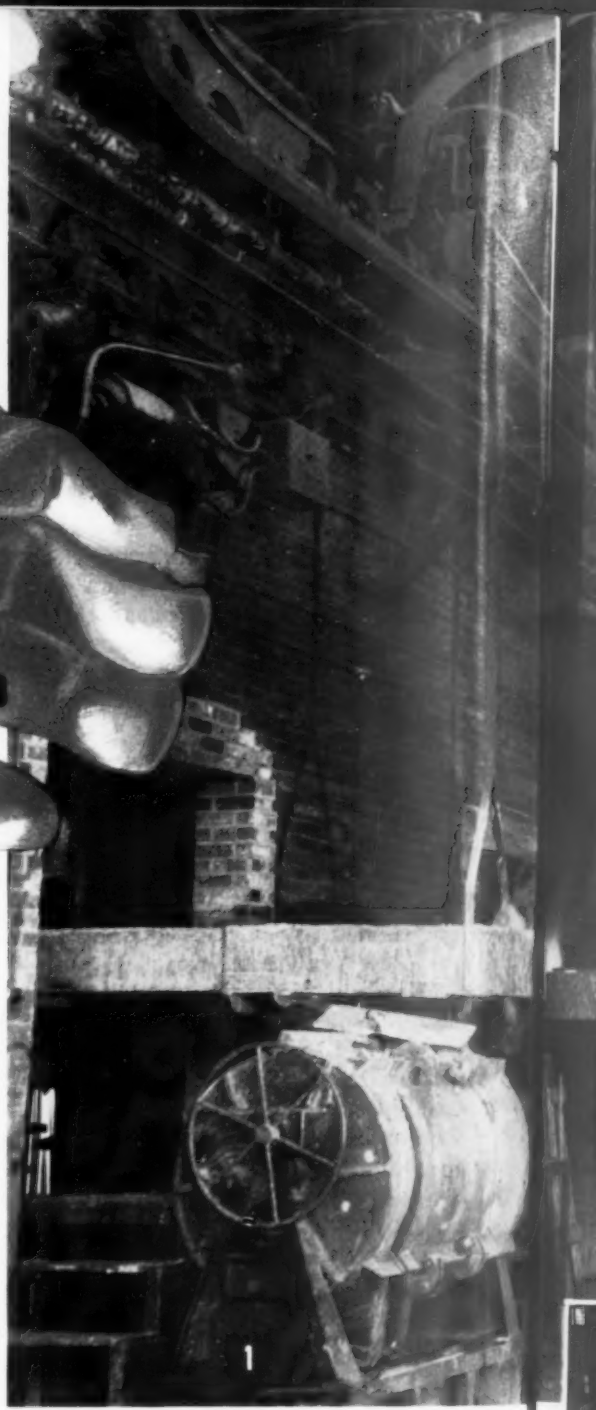
Mechanized Foundry

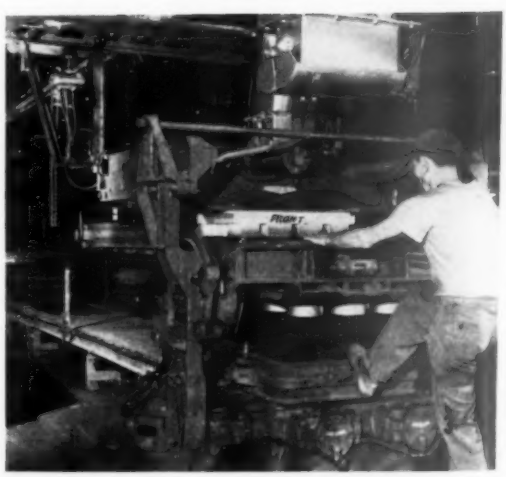
REDUCES MANUAL HANDLING

80 Per Cent

NUMEROUS features make the recently modernized gray iron foundry of Westinghouse Electric Corp. at East Springfield, Mass., unique among mechanized, high-production shops. The fact that the prime consideration in revamping this foundry —at a cost of $1,250,000—was to improve working conditions might be considered somewhat unusual, although this of course has been a recent trend in the industry. However, in most other expenditures of this size the need for increased production or lower operating costs has initiated the decision to modernize. In the case of the Westinghouse foundry, daily capacity has been increased from 40,000 lb of castings to 60,000 lb, but the need to provide a better place in which to work, in order to attract the right kind of employee, in the last analysis was the determining factor in approving the program.

Westinghouse has effectively attacked those conditions which in the past have been most objectionable in foundry work. Molten metal still is unavoidably present, but heat has been reduced by prompt discharge of poured molds to under-floor conveyors. Manual handling of material and equipment has been eliminated or reduced to an amazing extent, while the substantial improvement in ventilation, attested to by dust counts, leaves little to be desired on this score.





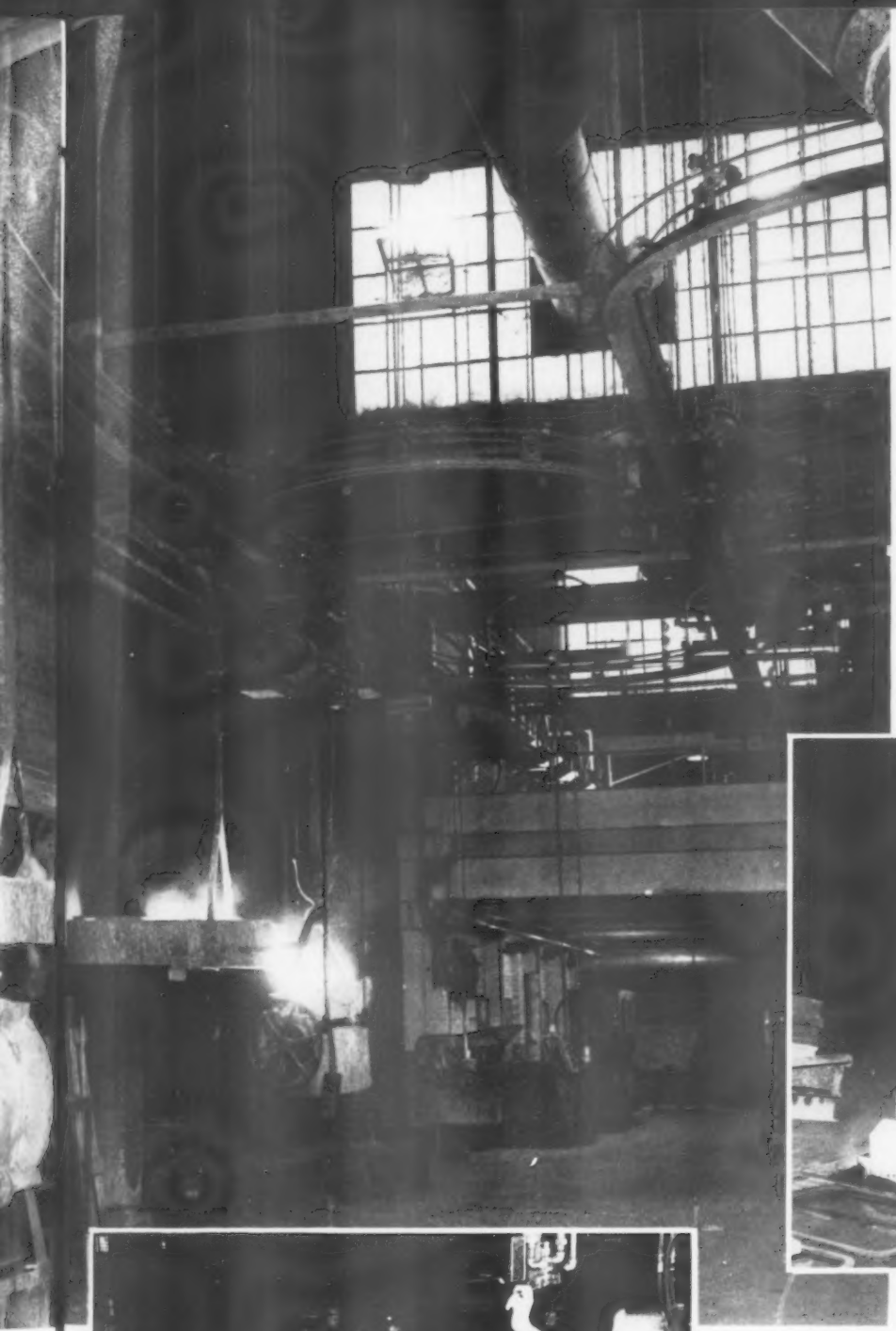


Fig. 1—Monorail system leading from the two cupolas to pouring lines at gray iron foundry of Westinghouse Electric Corp., East Springfield, Mass.

Fig. 2—Placing a drag flask on machine in one of the two motor housing molding lines. Manual lifting has been eliminated completely from these lines

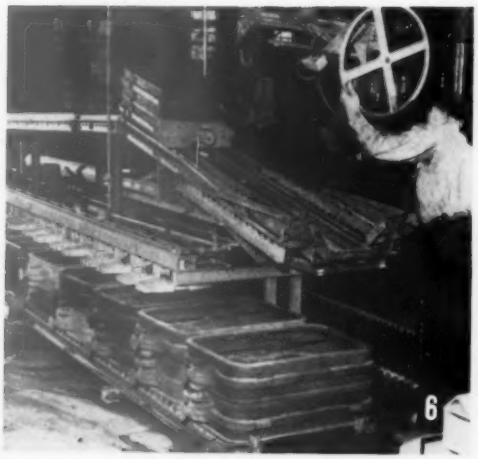


Fig. 3—Completed drag being pushed through machine onto roller conveyor

Fig. 4—Transfer car equipped with hydraulically actuated piston puts molds into position on pouring line

Fig. 5—Specially designed lifting and rollover bail facilitate shaking out the flask

Fig. 6—Pneumatic ram elevates empty flask to return conveyor leading back to molding stations

A check on the amount of manual handling required of the foundry's 75 employees today shows a reduction of 80 per cent from the 1470 tons of material and equipment they are estimated to have been required to handle daily under the old setup. Even more remarkable savings of human effort have been accomplished in certain cases. For instance, in molding housings for small refrigerator motors the operator formerly lifted 1322 lb per mold of four housings. This figure included 65 lb for handling flasks; 292 lb for shoveling sand; 357 lb for conveying molds; 88 lb for shifting pouring weights, and 520 lb for shaking out molds, conditioning sand, etc. The mechanized arrangement completely eliminates the manual part of these operations, which means that, on the basis of 500 molds daily, some 330 fewer tons need be lifted by hand than formerly.

In addition to the installation of modern equipment, an important factor in eliminating or reducing handling operations has been the company's development of new devices to do certain jobs. These, to be described in more detail later, include an air-operated system for placing and removing mold weights and an automatic mold shakeout. Empty flasks are returned automatically to gravity roller conveyors leading back to molding stations. Bottom boards are dispensed with by use of barred drags.

Ventilating equipment at the East Springfield foundry includes 18 fan-driven roof ventilators of 113,000 cfm capacity, in addition to localized exhausters at the principal dust producing points. Three bag type, dry dust collectors draw 33,000 cfm from tumbling barrels, blast barrels, grinders and sand blast units, collecting about 1 cu yd of dust daily. In addition, three wet type collectors serve the sand system, including shakeouts, and have a capacity of 60,000 cfm. Most of the dust collected by the latter is carried away with the waste water. Heavier particles, collected as sludge in a settling tank, represent a daily accumulation of about 1350 lb. Total air withdrawal is 206,000 cfm, providing 8.4 complete changes of air in the foundry hourly.

Forced air unit heaters are located at strategic areas to draw in fresh air from the outside or recirculate air in the building. The 16 heaters have a total capacity of 7.8 million Btu based on 5 lb steam at 60° temperature for the entering air. In addition, ten air curtain heaters with total capacity of 4.5 million Btu are placed at outside doorways and at entrances and exits of the trolley conveyor. The unit and curtain type heaters combined are capable of maintaining a temperature of 60° F inside the building with an outside temperature of zero and 15-mph wind.

While the foundry, with its 75 employees, is dwarfed by the overall East Springfield Works employing approximately 5000 persons, nearly every appliance made in the plant makes use of a gray iron casting in some form. This works is part of Westinghouse's Electric Appliance Division and turns out such items as commercial refrigerators, soft drink dispensers, garbage disposers, food mixers, fans, domestic refrigerator compressors, vacuum cleaners and domestic automatic washing machines. The gray iron castings required for these products include fan bases, housings for motors, compressor parts, etc., such as shown in Fig. 16. Ranging in size from ½-lb to 40 lb and in thickness from ⅛-in. to more than 2 in., the average casting weighs only 5 lb. However, the large quantities required—approximately 12,000 castings daily—permit long runs on individual patterns and a highly mechanized setup. Most of the

REDUCES MANUAL HANDLING

Fig. 7—Small casting line employs shallow flasks conveniently available to the molder from return conveyor line

Fig. 8—Cope and drag are rammed simultaneously on a machine operated automatically by push button

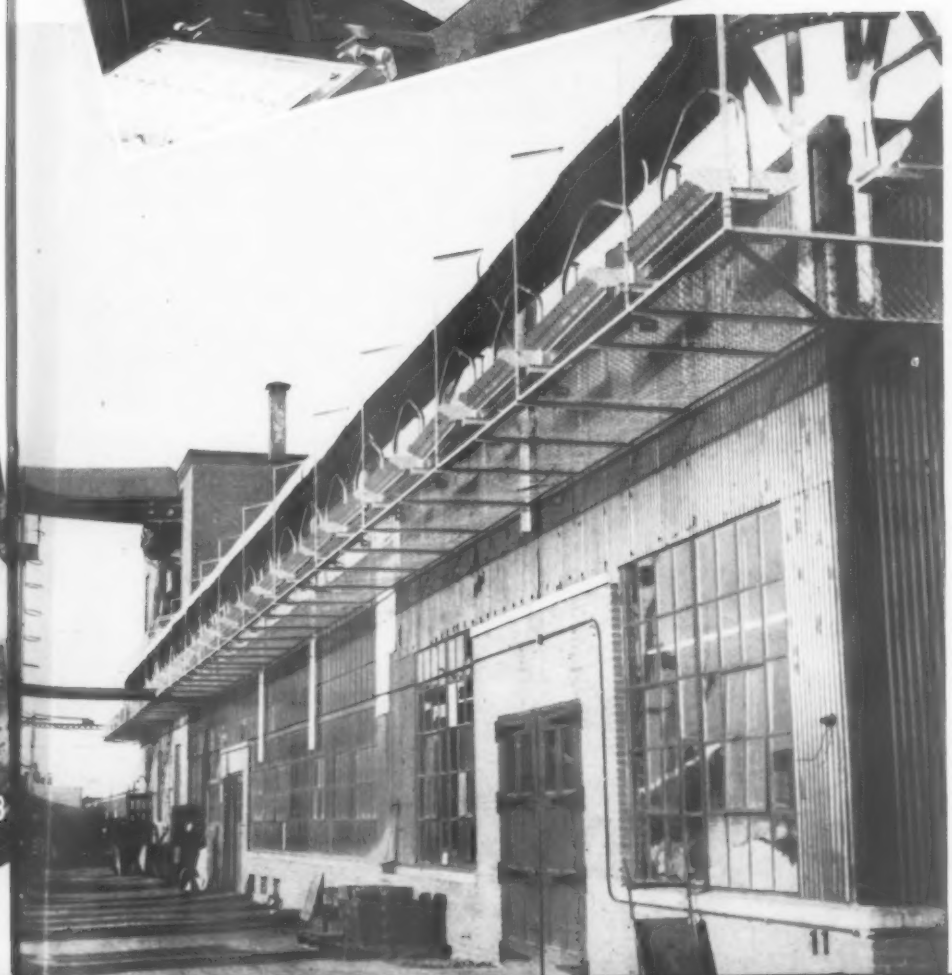


Fig. 9—Closing a mold. Air cylinders push completed molds down the double-decked conveyor lines

Fig. 10 — Triple decking the conveyors (the top deck is for flask return) conserves floor space and provides flexibility in molding and pouring schedules

Fig. 11—Tray conveyor moves castings from the shakeout to the sorting room

foundry's output is required at the East Springfield Works, but some castings are furnished to the company's Mansfield and Lima, O., plants.

The foundry building is of steel, brick and sash construction. Measuring 180 x 256 ft, it has 46,890 sq ft of useable floor space and includes three 50-ft high bays and five 24-ft low bays for a total of 1,472,000 cu ft of space. In addition an extensive tunnel system houses more than 400 ft of under-floor conveyors which handle hot castings and used sand. Seventy per cent of the side walls consists of windows. The floor is laid out in parallel bays 140 ft long, with two cupolas located at one end of the center bay. One side bay comprises the casting cleaning department, the center bay is used for large volume production of motor housings, and the third bay for high activity castings of small sizes. At one end of this last bay a few molding machines and single deck roller conveyor pouring lines are provided to handle short orders on miscellaneous parts. A total of 17 molding machines are used in the entire plant.

The two motor housing molding lines employ jolt-squeeze-rollover machines in molding the drags. Fig. 2 shows the molder placing a drag flask, which is picked up by hoist from the conveniently located gravity roll conveyor leading from the shakeout. Six castings are molded per flask. Sand is obtained from an overhead hopper equipped with air-operated gate, and excess sand drops through a floor grating to a spill conveyor belt below. After being rammed, rolled over and the pattern drawn, the drag is pushed through the machine onto a roller conveyor (Fig. 3). An adjoining jolt-squeeze machine of the automatic type molds the cope and strips the pattern. The operator picks up the cope with a hoist, which travels to the waiting drag over the monorail shown at the top of Fig. 3, and the mold is closed. The completed mold is pushed down the roller conveyor to an air-operated transfer car (Fig. 4) and is moved to position on the pouring line by means of a hydraulically actuated piston rod built into the transfer car.

When the molds are ready for pouring, the clamping plates shown at the left in Fig. 4 are quickly dropped on the copes by the turn of an air valve which controls the raising and lowering of the entire line of weights simultaneously. Clamping action is obtained by the applied air pressure. Molds are poured from 1000-lb capacity insulated geared ladles transported by hoists over a tramrail.

Poured molds are picked up at the shakeout located at the end of the roller conveyor line by a 1-ton capacity jib crane equipped with a specially designed lifting and rollover bail, as shown in Fig. 5. This rollover operation is necessary because the barred drag requires the flask to be shaken out with the cope down. The vibrating shakeout, 3 x 6 ft, is effectively hooded to trap dust, and discharges both sand and castings to a conveyor below the floor. The empty flask is placed on a ramp leading to a gravity roll conveyor (Fig. 6) and a pneumatic ram then takes over, pushing the flask up the ramp to the conveyor which leads back to the molding stations.

In this sequence of operations just described it will be noted that the workers' duties have consisted of manipulating the controls of various types of equipment; no manual lifting whatever is required.

Sand and castings from the two housing line shakeouts fall onto a 49-ft long oscillating trough conveyor below the floor and are transferred to a main conveyor of similar type which also receives spill sand over belt conveyors from the molding machines, as well as sand and castings from the small automatic molding lines. This main oscillating conveyor, 133 ft long, leads to a 4 x 8-ft shakeout screen from which the castings slide into a loading chute, while the sand drops through to a belt to start its return trip to the central sand system. Castings are fed automatically from the loading chute to 2 x 4-ft trays suspended from a 600-ft long trolley conveyor. This conveyor moves continuously at about 10 fpm.

From the loading point the tray conveyor moves outdoors, carrying the (*Please turn to page* 232)

Fig. 12—Molding sand from central system being plowed off into molders' hoppers

Fig. 13—Automatic shakeout on small casting line. Mold is shown here rolling into a basket supported on trunnions slightly off center

Fig. 14—Weight of the mold turns basket over with sufficient velocity to cause sand and castings to be discharged through hole in floor

Fig. 15—Piston rod automatically raises basket to unloading flask onto top gravity return conveyor

Fig. 16—Illustrating type and variety of gray iron castings produced

REDUCES MANUAL HANDLING
16

Questions AND Answers

Markers Made From Zinc Alloy

Q.—We shall appreciate information on the composition of alloys employed in making grave markers in 1880. We understand that the metal was known as white bronze. It looks like aluminum, and shows no signs of tarnish.

A.—One thing certain about the alloy is that it is not aluminum since the commercially successful electrolytic reduction process was not developed until 1886 by Hall in the United States and Heroult in France. Even then the price was so high that it hardly would be used for such castings. While it is possible that the material may have been what we term nickel silver, earlier known as German silver, the appearance is not very much like aluminum.

We believe that the grave markers you mention were made of zinc since it was used to some extent years ago for making statuary and ornamental castings. It resists atmospheric corrosion and has a bluish-white color and is somewhat similar in appearance to aluminum alloys. Only way to make sure of the composition is to obtain some drillings at a point where the grave marker will not be defaced, and have them analyzed.

Metal Mold for Brass Castings

Q.—We were much interested in the article "Die Coatings for Copper-base Alloy Permanent Mold Castings" which appeared in the February issue. At the present time we are making a great many permanent mold castings in aluminum-base alloy and zinc-base alloy, and want to make a line of our brass bathroom accessories such as soap dishes, towel bar posts, etc., in permanent molds so as to minimize the cutting down and polishing costs now existent with our sand castings. We are interested in obtaining information on the design of such molds, proper material for the molds, etc.

A.—Up to the present little has been published on the details of the method of making permanent mold brass castings, but so far as we know, practices are similar to those employed for producing aluminum alloy castings. Essential difference is that higher temperatures are involved. Consequently, the operating cycle may be slower, and the molds tend to heat check more rapidly than is the case with lower melting point aluminum alloys.

It might be well to point out that no matter what the mold material is, the basic principles to obtain sound castings are the same—that is to place the metal in the mold with the least turbulence, secure directional solidification, and feed all sections so a solid casting results. In this country gray iron is the mold material, although to some extent die steels may be used as they are to some degree in Europe. Special process gray irons also are used as in the case of aluminum-base alloys. We believe that gray irons high in total carbon will withstand thermal shock much better than the low total carbon irons.

Since you already are making permanent mold castings in aluminum and zinc, you should not have much difficulty in designing molds for copper-base alloys. In fact, we would suspect less trouble with gating due to the higher temperature and greater heat capacity of the copper-base alloys. On the other hand, those two factors mean longer time for metal solidification, and a tendency for the molds to get too hot. You probably have from time to time a mold for aluminum castings which is not in use, and we suggest that you try making a few experimental brass castings in it. This will give you an idea of what may be required in gating, etc., for designing molds suitable to the production of brass castings.

Has Trouble With Plow Points

Q.—We operate a small foundry in Canada and are having trouble in making satisfactory plow points for the neighboring farmers. As near as we can recall there are over 70 different types of plows in the district, and most of them are sword points rather than the plain point and coulter. We have trouble in getting the sword points to run full. We melt in a 14-in. ID cupola using 100-lb charges composed of 20 per cent steel plate scrap, 20 per cent machinery cast scrap, and 60 per cent pig iron to which we add 3 per cent nickel shot and 1 per cent chromium; sealing the alloys in a piece of steel pipe. While this mix gives us the best results, the points do not resist breakage too well. We use taper flask and follow board with point split and wedged to hold it in place. This requires careful work to draw it from the mold without breaking undercut sections. Hence, it is difficult to put up a floor and pour the same day. Is there anything which can be put on the chills to prevent blowing after they set overnight?

A.—It appears to us that part of your trouble is due to the composition employed since, in general, plow points are made from a low silicon iron to provide a tough, gray structure backing material which will give a good white fracture where the chill is applied to give wear resistance. Silicon content will vary to some degree, but usually is around 1.30 per cent. It would appear to us that the use of 3 per cent Ni and 1 per cent Cr would make an expensive plow point, not to mention the necessity of using larger gates and risers for alloy irons. We believe that the chromium gives you a material which is hard throughout.

As you undoubtedly know, plow points are made on squeeze machines containing both cope and drag patterns mounted side by side. In the case of the

drag pattern, the flange which forms the undercut or overhang, as you term it, is arranged so that it is stripped through the plate. That permits the drag mold to be lifted off without any danger of breaking the edges at that point. Probably you do not make enough of that type of plow point to warrant installation of a stripping device.

As yet there is no material which can be applied to chills to prevent blowing after they are allowed to remain in the mold for a long period. Trouble, of course, is that moisture in the mold cavity is precipitated on the chills. Sometimes trouble from that source is eliminated by heating the chills to a temperature slightly higher than the sand (but not to the extent that it dries the sand surrounding them) before insertion in the mold. However, we doubt that such a procedure will be of any benefit where the mold stands overnight. Another method which might be employed is to leave the molds open, and torch-dry the chills just before closing and pouring.

Permanent Molding Gray Iron

Q.—We would appreciate receiving information on material used in making permanent molds for cast iron. Also advise how these molds are used, expansion and contraction of this material, and with what degree of success.

A.—Permanent molds for production of gray iron castings are made from the same material. Preferably the mold iron is high in total carbon since that type is more resistant to thermal shock. One firm uses an iron of the following composition: TC 3.50 to 3.65 per cent, Si 2.50 to 2.65 per cent, Mn 0.70 to 0.90 per cent, and P 0.20 to 0.25 per cent. Previous to operation the mold faces are coated while hot with a refractory wash to protect them as well as to eliminate sticking of the castings. Additionally before the metal is poured each time the coated mold face is smoked with an acetylene torch burning with a yellow smoky flame. As far as the success of permanent molding of gray iron is concerned, it is suggested that you look in the October, 1948 issue of THE FOUNDRY which describes a prominent midwestern foundry melting around 200 tons of gray iron in 16 hr, and producing about 225,000 permanent mold castings in that period.

Test Bars Related To Section

Q.—We have a customer who desires gray iron castings conforming to ASTM specification A-4818. We also have to supply transverse test bars, and no specification is given as to whether the bars should be round or flat. Will you advise us on that point, and give the dimensions?

A.—Data on ASTM arbitration test bars is presented in ASTM Specifications for Gray Iron Castings A48-46, which may be secured from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, for 25 cents. Briefly, it calls for three different diameter bars for castings of different sectional thicknesses. One for castings with section thickness 0.50-in. and under is 0.875-in. diam and 16 in. long; for castings from 0.51 to 1.00-in. section thickness the bar is 1.20-in. diam and 21 in. long; for castings with section thickness from 1.01 to 2.00-in. the bar is 2 in. diam and 27 in. long.

Since considerable may depend upon the results obtained from the transverse bars submitted to the customer, the bars should be made carefully to obtain the highest possible values. To that end we suggest that you consider the method described by Jack H. Schaum, and published in the January, 1949 issue of THE FOUNDRY.

Producing Chill Surface Hole

Q.—Is there a practical way to chill a 1 or 1¼-in. diam straight hole through a casting in production? This hole is to be used for a bearing where a tapered hole would not be suitable. Some ten or twelve thousandths on the diameter is allowable for clearance. We wonder if coatings for the chill, or other methods of releasing the chill, have been developed. Also is there a better metal than cast iron for making the chill, and should it be solid or hollow?

A.—While there are several possible methods of providing a chilled hole in a gray iron casting, we believe that use of an austenitic cast iron rod of the proper diameter as the chiller probably will be most satisfactory. Austenitic iron contains about 14 per cent nickel and 6 per cent copper, and is available under the tradename "NiResist". That material has a higher coefficient of thermal expansion than gray iron, and expands rapidly when subjected to the heat of the molten metal. When casting and chiller cool

GANGWAY!

By J. A. PATTERSON

"But th' guy's good—just give him a few more minutes, Gus!!"

Questions AND Answers

to normal temperature, the latter is removed easily.

Another procedure which might be applied is the use of a tellurium wash or coating on a core. Possibly a method used to some extent in making nonferrous bushings could be used. In this the chiller is split diametrically into four sections, and thin sheets of asbestos paper placed in the splits. Still another practice is to give the chiller a thin coating of linseed or core oil, and then roll in silica flour. Chiller then is baked to drive off any volatile matter.

Procedure To Degas Aluminum

Q.—Will you please tell us the advantages and procedures of using nitrogen for degassing aluminum? Does this take the place of using flux? What is the length of time that nitrogen should flow through the molten metal?

A.—Nitrogen and chlorine are employed to remove hydrogen from aluminum, and thus prevent pinholing and microporosity due to that gas. However, to be effective both the gases, and also the tubes and hoses through which the gases are introduced into the aluminum, must be dry. If by a flux you are referring to a degasifying material based on chloride salts, the answer is that it performs the same purpose.

Method of introducing nitrogen is to use an iron pipe or tube which is coated with a refractory clay composition, or a graphite tube, to prevent iron pickup by the molten metal. The tube reaches to within 2 in. of the bottom of the crucible or pot, and the rate of gas flow should be such that rolling action of the bath rather than violent agitation occurs. Usual period ranges from 5 to 10 minutes per 100 lb of metal, and the temperature should be 1250 to 1350°F.

Shows Intergranular Fracture

Q.—We are sending you one-half portion of a test bar cut from a standard ASTM coupon. We rebroke this specimen on a bench press to determine whether this structure was uniform throughout—hence, the two pieces. When subjected to physical test, the test bar failed at 31,000 psi. Carbon content is 0.23 per cent and manganese is 0.45 per cent. We would appreciate your advice as to the cause of this condition; whether it is due to other chemical constituents or possible deficiencies in heat treatment or any other cause.

A.—The specimens submitted for examination are typical of intergranular fracture, otherwise known as "rock candy" fracture, which was discussed at the 1945 Electric Furnace Steel conference. It generally is accepted that this type of structure is due to aluminum nitride inclusions between the grains. The cause usually is holding the steel too long under reducing conditions at the end of the heat so that nitrogen is absorbed from the atmosphere at the arcs.

To minimize it, the aluminum should be kept on the low side since extra high aluminum is more likely to give rise to the condition. If it is suspected that a heat is going to give this fracture, it can be headed off by additions of titanium which combines with the nitrogen and prevents it from forming aluminum nitride, but it usually is not easy to anticipate the trouble in a heat.

Pipe Fittings in Metal Mold

Q.—We operate a foundry in Mexico for production of malleable iron castings, and are contemplating the manufacture of pipe fittings from ½ to 1 in. by the permanent mold process. We are enclosing a blueprint of one of the molds for making 16 elbows at a time, and would like to know if you can make any suggestions or changes on gating and venting. Also can you tell us if silica sand bonded with bentonite will be suitable for the cores? We intend to use an electric furnace for melting the iron, and would like to know the most suitable iron composition for the fittings as well as the shortest and best annealing cycle.

A.—Since we do not know of any firm in this country producing malleable iron fittings in permanent molds, we cannot offer any definite suggestions except to say that it might be a good idea to make only a pilot mold containing four fittings to determine the feasibility of the project. We believe that considerable experimental work will be required before satisfactory results can be obtained. As far as cores are concerned, we believe that an oil-sand mixture with the minimum binder (and cereal) will give the best results, since there will be less gas to be vented from the mold, and they will collapse easily.

While many malleable iron pipe fittings are made by the cupola process in this country a number of firms use air furnace iron of the grade 32510, which calls for the following compositions range: TC 2.30 to 2.70 per cent; Si 1.20 to 0.80 per cent; Mn under 0.55 per cent; P under 0.20 per cent, and S under 0.180 per cent. Minimum tensile strength of such iron is 50,000 psi, yield strength 32,000 psi and elongation 10 per cent. We believe for the fittings, it would be advisable to hold to the high side with total carbon, and the same with the silicon, as long as primary graphite does not appear.

If you can use a metal mold, the silicon content can be higher than in a sand mold, due to the chilling action. High carbon, high silicon malleable iron can be annealed more rapidly than the regular types, and if you had suitable equipment, you probably could anneal in 48 to 72 hours. However, to obtain a short cycle you would have to have a furnace that could attain a temperature around 1750°F in a short time, and means for rapidly cooling the castings after the first stage of graphitization is completed—down to just above the critical range. Then the castings are allowed to cool slowly through the critical range as in usual practice.

One method of obtaining the rapid cooling is to employ cooling tubes near the roof of the furnace or

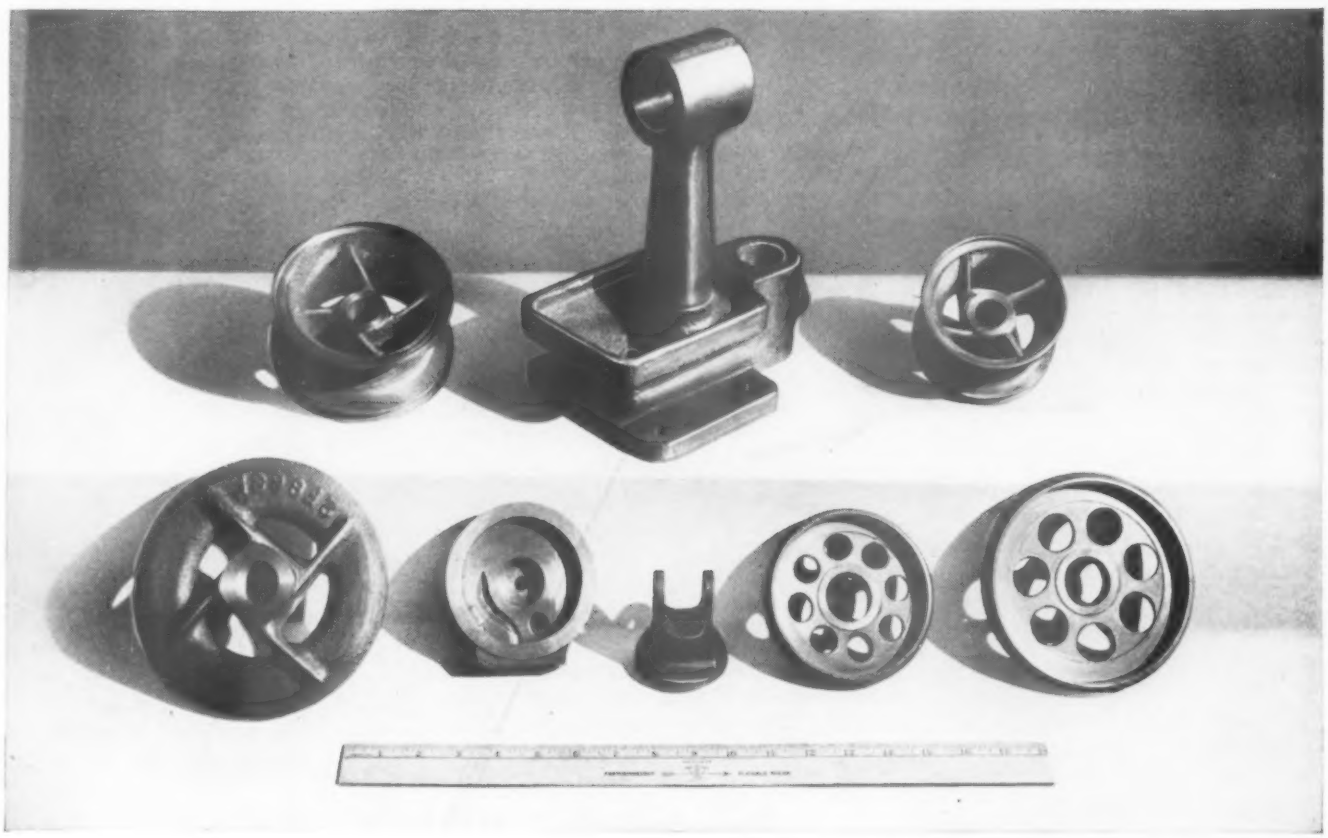
(*Concluded on page* 98)

SPECIFY THIS POWERFUL, POSITIVE INNOCULANT

NISILOY*

to eliminate hard chilled areas in gray iron castings

. . . REDUCE machining time, tool wear, rejections



Produce *machinable* gray iron castings regardless of sharp variations in section thickness . . .

Eliminate localized hard areas or chilled (white) edges and surfaces . . .

Reduce machining time, tool wear and rejections . . . *raise both quality and quantity of your output by controlling gray iron structure with small ladle additions of NISILOY.*

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Questions AND Answers

(*Concluded from page 96*)

oven through which cold air is blown as shown on page 71 in the September, 1948 issue of THE FOUNDRY. Another is to use water-cooled coils which are inserted into the furnace as described on page 126 in the December, 1946, issue.

Metal Temperature Is Too Low

Q.—We operate a foundry in Spain using two cupolas with forehearths attached. Due to the shortage of pig iron we must use a high percentage of steel scrap with additions of ferroalloys. However, we cannot obtain iron any hotter than 1350°C (2462°F) as determined by an optical pyrometer. We have seen several sketches showing the heating of the forehearth by the flame and gases from the cupola without use of oil or powdered fuel. Can you tell us if that method is effective, and which arrangement is best?

A.—While some foundries in this country are equipped with forehearths similar to the ones you are using, the arrangement is such that the only heat supplied is that from the molten iron. The type you mention with an additional connection of forehearth to the cupola near the tuyere zone was used in Europe to some extent at one time, and possibly still is. However, it would appear that any benefit gained would be overshadowed by cost of installation and upkeep as it hardly is a simple arrangement.

You do not mention whether the forehearth is heated prior to the metal flowing in from the cupola. That should be done as in the case of any ladle or other holding device, otherwise the iron loses so much temperature in heating up the refractories that it is far from being suitable for pouring into castings. The forehearth should be heated sufficiently in advance of the first iron from the cupola that the refractories are at a white heat when iron flows from the cupola.

Possibly your trouble may not originate entirely in loss of temperature in the forehearth, and is due to poor melting conditions in the cupola itself due to improper bed height, coke splits between charges, and amount of air supplied. We suggest that you determine the temperature of the metal leaving the cupola, and then make the necessary changes which will bring the iron down at the highest possible temperature. Without knowledge of the size of the cupola, etc., we cannot make any suggestions as to possible bases to work from. However, we might point out that with high percentages of steel scrap in the charge, more coke will be required to supply the lack of carbon in the steel as compared to that in gray iron.

For example, if you are using a 1000-lb charge composed of 60 per cent steel scrap with a carbon content of 0.20 per cent, and 40 per cent gray iron scrap containing 3.30 per cent total carbon, the resulting carbon content will be 600 × 0.002 plus 400 × 0.03 or 14.40 lb or 1.44 per cent. Assuming that you expect an iron containing a 3.15 per cent total carbon, or 31.50 lb in the 1000-lb charge, 31.50 minus 14.40 or 17.10 lb of carbon will have to be supplied by the coke. As the coke is not pure carbon we will assume that it contains 85 per cent, so that 20 lb more of coke will have to be added to the coke split between charges to supply the deficiency.

Wants Formula for Sand Match

Q.—We have tried various combinations in an attempt to make a good, firm, sand match, but up to the present have not succeeded in getting a device that is perfectly satisfactory in every respect. We shall appreciate a good working formula.

A.—Nearly every foundry where hard sand matches are made and used has a pet formula for the mixture. Some men favor all new molding sand. Others add varying amounts of sharp sand, ranging from 10 to 50 per cent. Others again make the matches from refuse under the tumbling barrels, or from spent sandblast sand. Matches that are dried in the oven are made from regular core sand mixtures in which the sand is bonded with any of the usual core binders. Naturally in this type the frame is metal instead of wood.

Where a substantial follow board or sand match is required, one that will stand up in repeated use over a comparatively long period, the new sand is mixed with linseed oil and a small amount of litharge, say a small handful to a shovelful of sand. The sand is dried and then mixed with linseed oil or other core oil in the proportion of 1 part oil to 25 parts sand. Sufficient water is added to render the mass workable. Some foundrymen add varying amounts of spent sandblast sand, or dust from the tumbling barrels, to the new molding sand. This type of sand match will dry hard in about 24 hours when it may be given a light finishing touch with a coat of shellac. It also should be pointed out that commercial products are available which are used with excellent results for hard matches and patterns.

Wants To Produce Chill Rolls

Q.—We are interested in the art of casting chilled iron rolls. If you have information, or know where we can secure it, we will appreciate hearing from you.

A.—The art of making chilled rolls probably represents one of the highest achievements in foundry practice. In addition to a thorough grounding in metallurgy, the roll maker has to be an expert operator of the cupola and air furnace. Over the period of practical operation he develops a sixth sense that can be acquired in no other manner. Unfortunately, we cannot recall any recent literature on the subject to which you can refer. If you are located in a large city which has a library carrying bound volumes of THE FOUNDRY, we could supply some references to articles.

Suppose your foundry employed less than 100 . . .

If your foundry employed less than 100 workers, would you unload annealing cars with a sling—or with a magnet?

The profitable answer to this question is determined neither by size of your plant nor investment involved. Consider, instead, your *total* unloading time. Fully 50% of it is consumed in attaching and removing wire or chain slings from castings.

With an Ohio Magnet, however, you lift *instantly*. There's no lost time before and after the move. The man-hours you save pay for magnet cost in a few short months.

Save time . . . save money by turning costly man-hours into profitable magnet-minutes. Write to Ohio—*25 years a leader in magnetic materials handling.*

How would you unload annealing cars?

SELECT YOUR MAGNET from two Ohio types. The PROTECTO-WELD magnet, shown above, is made in 39, 46, 55 and 65-inch diameters. Bolted construction types include these and other smaller sizes. Ohio also builds magnet control equipment.

5 TYPICAL JOBS WHERE OHIO MAGNETS CUT COSTS

- unloading scrap, rails and pig iron.
- loading charging cars, hoppers and buckets.
- loading and unloading annealing cars.
- moving bulky castings in cleaning dept.
- picking up sprues, gates, runners, overflow.

THE OHIO ELECTRIC MFG. CO. • 5900 MAURICE AVENUE • CLEVELAND 4, OHIO

Ohio MAGNETS

A-2029

Men OF INDUSTRY

LUTHER A. KLEBER has been appointed assistant vice president in charge of manufacturing, General Steel Castings Corp., Eddystone, Pa., and Granite City, Ill., with headquarters at the latter city. Mr. Kleber joined the company in 1940 as assistant superintendent of the foundry, core and pattern departments, at the Commonwealth Plant, Granite City, where he became superintendent in 1944. He has been assistant works manager there since 1947. Prior to joining General Steel Castings Corp. he was associated with Taylor-Wharton Iron & Steel Co., Highbridge, N. J. Mr. Kleber has had wide training and experience in steel foundry methods and practices and has made important contributions to the development of manufacturing processes at General Steel Castings Corp. He has been active in the American Foundrymen's Society and Steel Founders' Society of America.

♦ ♦ ♦

Fred A. Pritzlaff, for the last 15 years foundry superintendent, the Falk Corp., Milwaukee, has been appointed consultant on foundry problems to Harold F. Falk, vice president-works manager. In addition to his consulting duties Mr. Pritzlaff will continue to be responsible for pattern shop operations. He joined the company as an office boy, at the age of 16, and has continued the association for 47 years. He is a member of the American Foundrymen's Society, American Society for Metals and served as district vice president of the Steel Founders' Society of America. **Carl Haertel** has been named foundry superintendent in charge of that department. Mr. Haertel was a Falk college co-operative trainee during his years at Marquette University College of Engineering, and entered the foundry following graduation in 1924. Since 1938 he has been assistant superintendent. He is a member of AFS and ASM.

♦ ♦ ♦

James T. Gow has been named chief metallurgist, the Electric Steel Foundry Co., Portland, Oreg., in charge of the foundry's metallurgical department covering sand and chemical control, physical testing, radiographic inspection, melting and pouring, field calls and research. Mr. Gow, a graduate of University of Minnesota School of Mines and Metallurgy, has been associated with the Battelle Memorial Institute, Columbus, O., for the last 13 years, where he became supervising metallurgist in industrial metallurgical research. He has written a number of technical publications in the field of physical metallurgy and holds several patents on metallurgical processes and steel alloys.

♦ ♦ ♦

Ralph H. Lott has been appointed co-ordinator of sales, Sterling Grinding Wheel Division, the Cleveland Quarries Co., Tiffin, O. **Arthur J. Schneider** has been named general sales manager and **William F. Schlick,** succeeds Mr. Lott as district manager of the Chicago branch. Mr. Lott, who joined the company in 1904, was transferred to the Chicago area in 1913 as sales representative, becoming district manager there in 1938. Mr. Schneider, with the company since 1934, served as St. Louis representative until 1946 when he was transferred to the sales office in Tiffin as assistant sales manager. Mr. Schlick, formerly a member of the company's sales organization in Cleveland, joined the company in 1944.

♦ ♦ ♦

Howard E. Pellett, formerly research supervisor, Republic Steel Corp., Cleveland, has been appointed sales engineer in California, Nevada and Arizona, for Riehle Testing Machines Division of American Machine & Metals Inc., East Moline, Ill. He will maintain an office at San Francisco and one at Los Angeles. Mr. Pellett has had wide experience in specifying, fabricating, heat treating and testing steel.

♦ ♦ ♦

William H. Worrilow, president, Lebanon Steel Foundry, Lebanon, Pa., was guest speaker recently at a Pacific Coast dinner of the Newcomen Society of England, held in San Francisco, to honor **James Lick,** pioneer leader in California's first years of statehood. James Lick was born near Mr. Worrilow's own birthplace in Pennsylvania.

♦ ♦ ♦

Joseph V. Britt, controller, Unitcast Corp., Toledo, O., and **Walter R. Hummel,** treasurer, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., have been appointed to the membership committee for the Controllership Foundation, the Control-

(*Continued on page* 102)

LUTHER A. KLEBER

FRED A. PRITZLAFF

CARL HAERTEL

JAMES T. GOW

SLY TUMBLING MILLS

THE STANDARD OF STURDINESS

The SLY name on your Tumbling Mills has been the Standard of Sturdiness for many years.

Modern Design Throughout

Anti-Friction Bearings — Direct Motor Drive

Sturdy Construction for

Long Life — Low Maintenance

SLY TUMBLING MILLS
Can be Furnished as Follows:

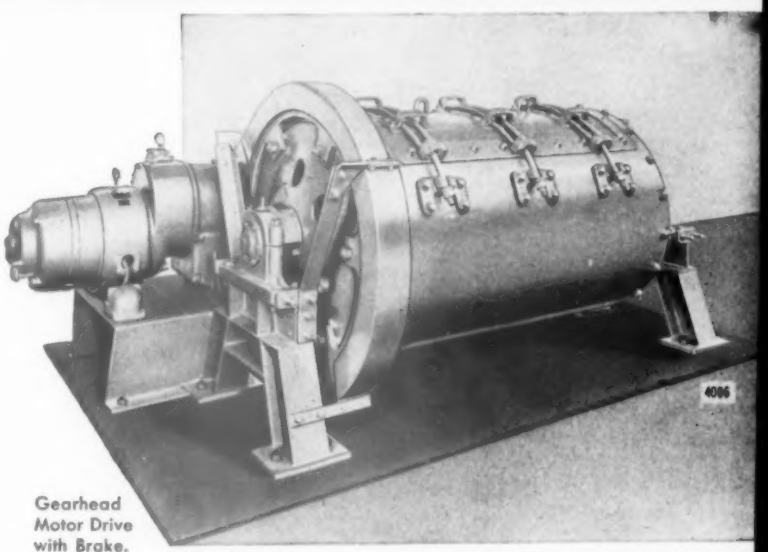
Inside diameters: 24″, 30″, 36″, 42″, and 48″.
Inside length from 36″ up.

Special Designs for

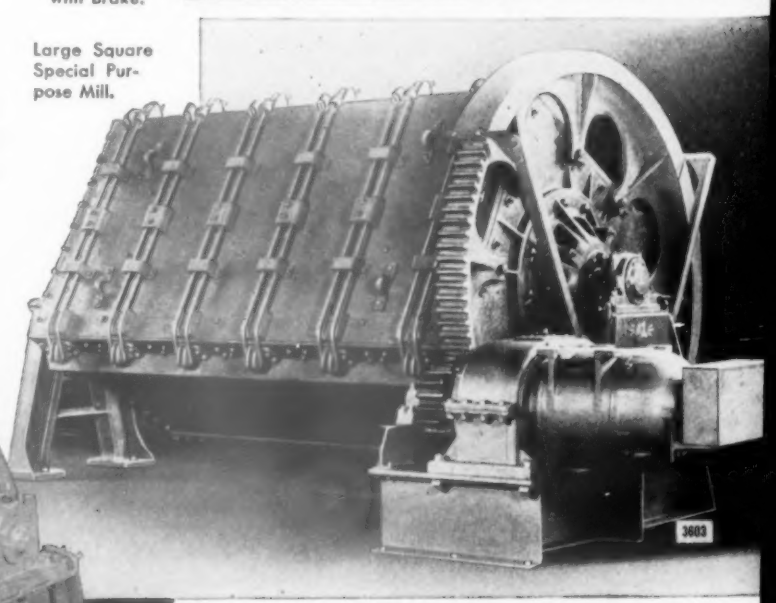
Stove Plate	Sprue Cleaning
Soil Pipe	Welding Rods
Waterpipe Fittings	Cast Anchor Chain

Drives for Mills

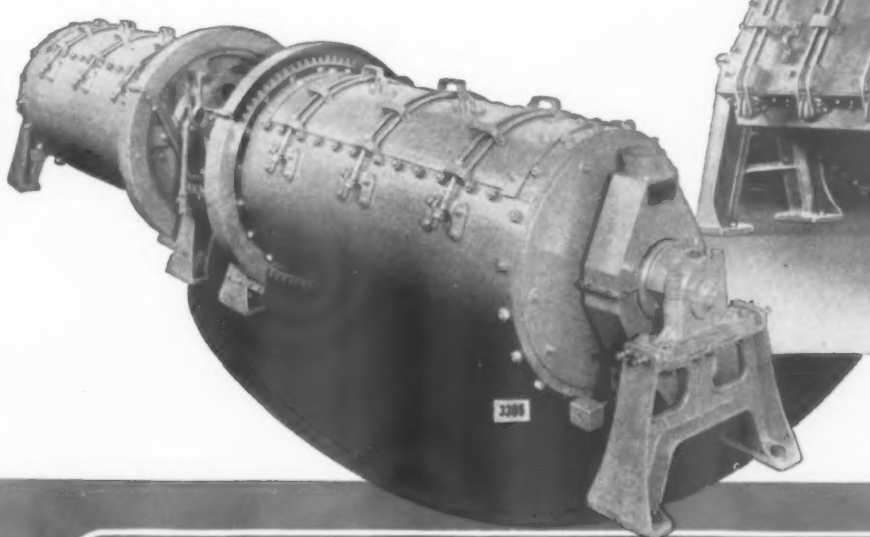
For greatest flexibility we recommend individual direct motor drive, but mills can also be furnished with V-belt drive, or tight and loose pulley for flat belt drive.



Gearhead Motor Drive with Brake.



Large Square Special Purpose Mill.



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Representatives in New York • Chicago • Philadelphia • Detroit • St. Louis
Toronto • Minneapolis • Cincinnati • Rochester • Los Angeles • Birmingham

(*Continued from page* 100)
lers Institute of America, New York. The foundation conducts surveys and studies in the financial management field.

♦ ♦ ♦

R. G. Neilson has been appointed general manager of production and manufacturing, Mackintosh-Hemphill Co., at the company's plants in Midland, Pa., and Pittsburgh. Mr. Neilson started as a roll turner under his father and worked on iron and steel industrial rolls in such plants as United Engineering Co., Mesta Machine Co., Crucible Steel Co. of America, and was in charge of the Timken Roller Bearing Co. roll shop for 4 years. He joined Mackintosh-Hemphill in 1933 where he was in charge of the roll shop at Pittsburgh for 2 years. He was transferred to the sales department in 1935 and was in charge of sales in the New York area until 1947, when he returned to supervision of the roll shop at Pittsburgh.

♦ ♦ ♦

William E. Carver has been appointed chief engineer, Light Metals Inc., Indianapolis, producer of aluminum and magnesium, sand and permanent mold castings. Mr. Carver was formerly associated with Bohn Aluminum & Brass Corp., Detroit, from 1926 to 1939, as mold designer. From 1939 to 1944 he was chief engineer of the permanent mold division, Monarch Aluminum Mfg. Co., Cleveland, where he became manager of the quality control department. He spent the following year as chief engineer, Permacel Aluminum & Brass Corp., Waltham, Mass.

♦ ♦ ♦

Herbert T. Florence will continue as president, Cleveland Crane & Engineering Co., Wickliffe, O., which was acquired recently by the McNeil Machine & Engineering Co., Akron, O. Mr. Florence joined Cleveland Crane in 1922 and has served in various shop departments, engineering and sales capacities. He became general manager in 1938, vice president-general manager in 1941, and president-general manager in 1946. The company will continue to operate as Cleveland Crane & Engineering Co.

♦ ♦ ♦

Gerald F. Goetsch, for the past 8 years assistant manager of orders and sales engineer, Sterling Wheelbarrow Co., Milwaukee, has been named district manager of western New York and northwestern Pennsylvania, with headquarters in Buffalo. Mr. Goetsch is well known in the south and west and has had considerable experience in foundry flask problems. He is a member of the American Foundrymen's Society.

♦ ♦ ♦

Henry E. Trimble has been appointed assistant foundry production manager for United Conveyor Corp., Chicago. Mr. Trimble, who attended Maryland University, was engaged in the foundry industry in Kansas City, Mo., for 10 years. He operated his own foundry for 4 years and worked 7 years for the Navy Department, five of which were spent as foundry manager of the Naval Ammunition Depot, Crane, Ind.

♦ ♦ ♦

J. H. Oakes has been appointed sales manager of enclosed drives, Link-Belt Co., Chicago, with headquarters at its Philadelphia plant. **Harry F. Kurz** will assist Mr. Oakes as representative with headquarters at the Chicago plant. Mr. Oakes attended Hanover College and Purdue University and entered the experimental department of the Dodge plant of the company at Indianapolis in 1929, where he had worked part time while attending college. From 1930 to 1935 he worked on development and engineering application of the variable speed drive at Philadelphia. Since then he has served as application engineer, assistant divisional sales manager and sales manager of gears at that plant. Mr. Kurz, who joined the company in 1935 at Philadelphia, has served there in the order, engineering and sales departments and until recently as divisional sales manager of enclosed gear drives.

♦ ♦ ♦

Changes of personnel within the organization have been announced by Syntron Co., Homer City, Pa., manufacturer of vibratory material handling and construction and maintenance equipment. **George L. Chedsey** has been appointed supervisor of mining equipment, working out of the main office. **E. J. McIlvaine** has been named junior salesman in the vibratory material handling division of the St. Louis, Mo., office. **John C. Mitchell** has been put in charge of power tool sales in the Boston office. **A. C. Staley Jr.** becomes junior salesman in the vibratory material handling division and **F. J. Kirby Jr.** will handle power tool sales, in the Cleveland office.

♦ ♦ ♦

Cecil E. Gorman, formerly associated with MacDonald Metals & Plastics Ltd., Waterloo, Que., has been appointed works manager, S. Vessot Co. Ltd., Joliette, Que., Canada.

♦ ♦ ♦

Roland F. Boehm, formerly district sales manager of the Houston, Tex., office, Mathieson Chemical Corp., New York, has been transferred to the ammonia department with headquarters in the New York offices. **O. J. Theobald Jr.,** who has been district sales manager of the Charlotte, N. C., office, succeeds Mr. Boehm at Houston. **J. F. Carey,** until recently sales representative in

(*Continued on page* 106)

R. G. NEILSON

WILLIAM E. CARVER

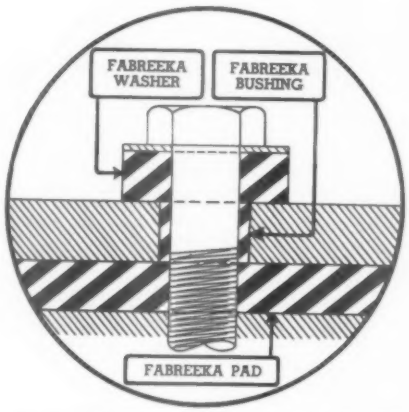
HERBERT T. FLORENCE

GERALD F. GOETSCH

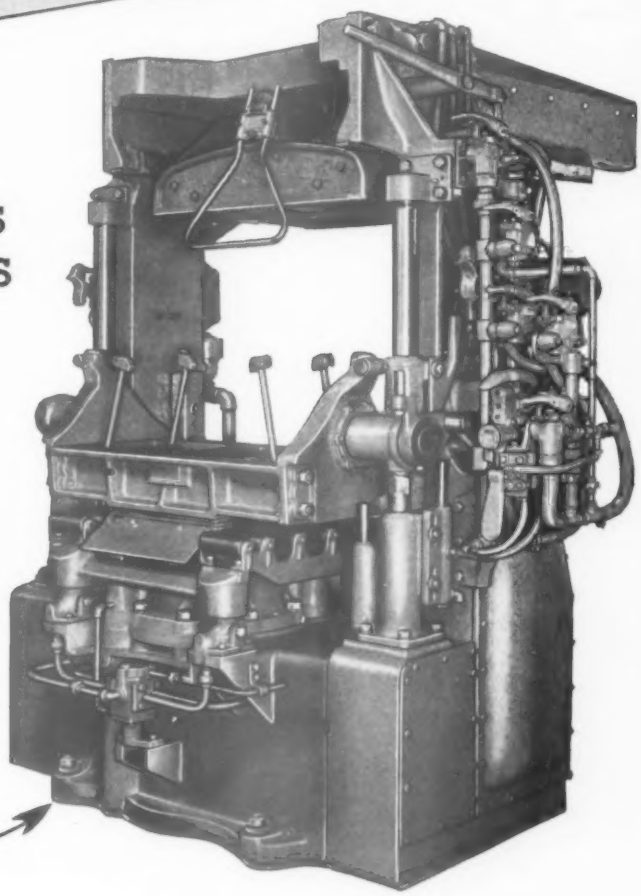
Under Jolt Moulders

FABREEKA

REDUCES
THE DESTRUCTIVE EFFECTS
OF HEAVY IMPACT SHOCKS
AND VIBRATION . . .



CROSS SECTION OF FABREEKA INSTALLATION



FABREEKA Pads, bushings, and washers are installed under Jolt Moulders, Shakeout Machines, Tumbling Barrels and other heavy machinery to reduce the effects of heavy impact shocks and destructive vibration.

FABREEKA has demonstrated its ability to prevent breakage of machine parts and to keep bolts tight, thereby reducing maintenance and increasing production.

In addition to these important advantages, Fabreeka has long life, which makes its final cost a low cost.

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222B Summer Street
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It Pays to Specify Fabreeka

for IMPACT SHOCK and VIBRATION

How

CLEANING

New, informative book gives complete, concise information on all phases of airless blast cleaning. Write today for Catalog No. 74-A.

(Above) Removing thoroughly cleaned cylinder blocks from the monorail conveyor of the Wheelabrator Cabinet.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

WHEELABRATOR® Saves $110.16 per day

CYLINDER BLOCKS

WHEELABRATOR MONORAIL CABINET PAYS FOR ITSELF FROM SAVINGS

In addition to actual dollars-and-cents savings in costs, the user—a prominent mid-western foundry*—is experiencing cleaner working conditions, uninterrupted production, and a finish of uniformly high quality. Besides, the machine has the capacity for anticipated future requirements.

In the competitive days ahead it will pay to check the benefits you can get by "Wheelabrating" . . . . benefits that nearly 5000 users are putting to work every day. An analysis by our engineers will give you definite facts on the savings you can count on when a Wheelabrator is applied to your cleaning problems.

* Name on request.

Compare these Figures

OPERATION

FORMER METHOD	PRESENT METHOD
14 Tumbling Mills 1 Airblast Room (Monorail)	Wheelabrator Monorail Cabinet (with three wheels)
PRODUCTION 125 cylinder blocks per hour	**PRODUCTION** 142 to 180 cylinder blocks per hour
LABOR 45 men for all cleaning operations (shake-out gang, tumbling mill and airblast room operators, chippers and inspection crew).	**LABOR** 31 men for all cleaning operations (shake-out gang, Wheelabrator operators, chippers and inspection crew).

COSTS AND SAVINGS

	FORMER METHOD	WHEELABRATOR	SAVINGS
Labor, Power, Maintenance	$ 56.68 per hour	$ 42.91 per hour	$ 13.77 per hour
Cost per block	.453	.238	.215
Cost per 8 hour day	$453.44	$343.28	$110.16

THE AMERICAN WHEELER
TRADE MARK REG. U.S. PAT. OFF.

American

WHEELABRATOR & EQUIPMENT CORP.

505 S. BYRKIT ST., MISHAWAKA 2, INDIANA

(*Continued from page* 102)
the Charlotte territory, has been named district sales manager there.

♦ ♦ ♦

Robert C. Stanley has resigned as president, the International Nickel Co. of Canada Ltd., and will continue as chairman of its board of directors. **Dr. John F. Thompson** succeeds Mr. Stanley as president. Dr. Thompson became associated with the company as a metallurgist in 1906 and has been executive vice president since 1936. **Dr. Paul D. Merica,** who has been with the company since 1919 and vice president since 1936, has become executive vice president. **Henry S. Wingate,** since 1939 secretary, has become a vice president and continues as secretary.

♦ ♦ ♦

Kempton Dunn has been elected vice president and **Cyrus E. Brush,** secretary, the American Brake Shoe Co., New York. Mr. Dunn was graduated from Yale University and joined the company in 1932. He became treasurer in 1942, and assumed the additional duties of secretary in 1947. He will continue to serve as company treasurer. Mr. Brush, a graduate of Cornell University, became associated with Brake Shoe in 1946 as an attorney, following his return from Navy service. He was appointed assistant secretary in 1947.

♦ ♦ ♦

Dr. G. V. Slottman has been appointed director of research and engineering, Air Reduction Co., New York. Graduated from Massachusetts Institute of Technology in 1925, Dr. Slottman received his Ph.D. from University of Berlin in 1927 and returned to M.I.T. as a professor of chemical engineering. For 4 years he served as chief combustion engineer and iron works manager, United Steel Companies Ltd., Sheffield, England, and in 1934 joined Air Reduction. In 1946 he was appointed manager of the technical sales division and for the past year has been technical assistant to the vice president of the company.

♦ ♦ ♦

John E. Mullen, vice president in charge of sales, National Erie Corp., Erie, Pa., has been appointed to the

JOHN E. MULLEN

executive committee of the Steel Founders' Society of America. Other members of the committee are the president and vice president of the society—Thomas H. Shartle, Texas Electric Steel Casting Co., and G. Clymer Brooke, Birdsboro Steel Foundry & Machine Co.

♦ ♦ ♦

Roy E. Jones has been named export manager, Link-Belt Co., Chicago, with headquarters in the New York office, succeeding **Carl A. Woerwag,** who has retired from active service because of ill health. Mr. Jones was graduated from University of Pennsylvania with a degree in mechanical engineering and joined the Philadelphia plant of the company in 1927. Following 7 years in engineering, estimating, design, and general sales work, he was transferred to domestic sales at the New York office. He has worked on export sales since 1941 and became assistant export manager in 1934.

♦ ♦ ♦

Richard E. Hitchcock has been appointed field engineer and sales representative for the New York area, Hannifin Corp., Chicago, with headquarters at Fairlawn, N. J. Mr. Hitchcock, a graduate of University of Nebraska, was formerly East coast sales engineering representative for the Bendix Products Division, Bendix Aviation Corp., New York. Previously he had extensive engineering experience with the Curtiss-Wright Corp., New York, and Bendix in the design and development of hydraulic and pneumatic devices as well as in production phases of manufacturing parts.

♦ ♦ ♦

Charles Morrison, recently foundry consultant, Benton Harbor Malleable Industries, Benton Harbor, Mich., has been appointed general manager of the malleable iron foundry, gray iron foundry, machine shop, die cast plant and drop forge. **A. J. Edgar,** works manager, has been placed on special assignment to develop production, engineering and sales of ductile cast iron, a new ferrous cast metal which Benton Harbor Malleable Industries has been licensed to produce by International Nickel Co. Inc.

♦ ♦ ♦

Rear Adm. William Granat, U. S. Navy (Retired) has resigned as treasurer, Lester B. Knight & Associates Inc., Chicago. Adm. Granat joined the company in 1947 following years of experience in Bureau of Ordnance and office of the Secretary of the Navy. He spent 4 years at U. S. Naval Gun Factory, Washington, as

(*Concluded on page* 108)

DR. JOHN F. THOMPSON

CYRUS E. BRUSH

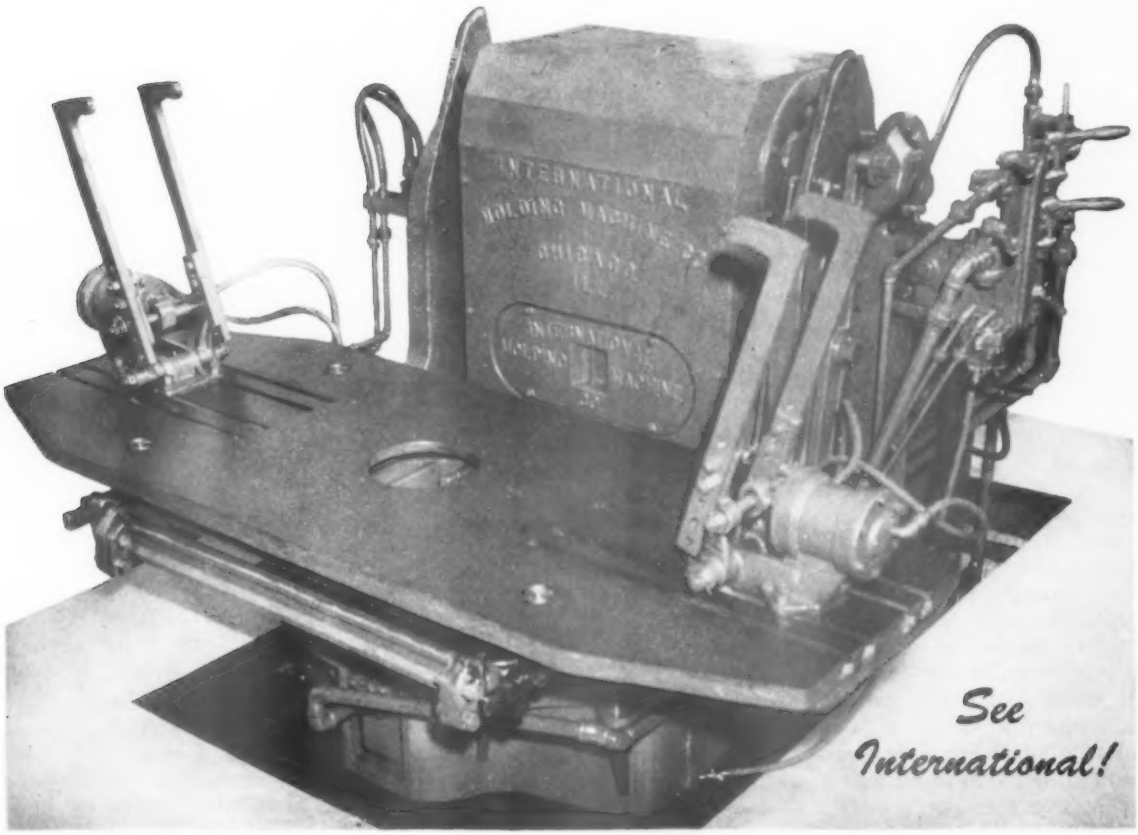
KEMPTON DUNN

DR. G. V. SLOTTMAN

For LARGE Jolt - Rollover - Draw Work

INTERNATIONAL

TYPE F MACHINE



INTERNATIONALS are made in 90 Standard Types and 1400 Different Sizes. Special Designs to meet your special requirements may be developed for you. Foundries maintaining High Production are equipped with INTERNATIONALS. "There's a type for Every Job."

INTERNATIONAL FOUNDRY ENGINEERS, trained with practical experience of the working needs in the modern foundry, are ready to consult with you about your particular mechanical problems.

INTERNATIONAL MOLDING MACHINE CO.

LA GRANGE PARK, ILLINOIS • (Suburb of Chicago)

(*Concluded from page* 106)

head of its laboratories. He will remain in Chicago until June when he will return East.

♦ ♦ ♦

A. F. Anjeskey, sales manager, Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, O., has been elected president of the Monorail Manufacturers' Association, New York. **Wilbur Mayer,** sales manager, the Louden Machinery Co., Fairfield, Iowa, has been named vice president, and **E. Donald Tolles,** secretary-treasurer.

♦ ♦ ♦

E. L. Shaughnessy has been appointed a sales representative in the Wisconsin-Minnesota area for Werner G. Smith Co., Division of Archer-Daniels-Midland Co., Cleveland. Mr. Shaughnessy attended University of Minnesota and was associated with the Minneapolis-Honeywell Regulator Co., Chicago, for a number of years. For the past 2 years he has been a metallurgical engineer in the Werner G. Smith Foundry Research Laboratory, Minneapolis.

♦ ♦ ♦

H. L. Campbell has joined Precision Scientific Co., Chicago, where he will devote his attention to foundry sand and core testing equipment. Mr. Campbell received a master's degree in engineering from University of Michigan, and from 1921 to 1936 supervised foundry and forge shop courses there. During this period he wrote *Metal Castings,* and *The Working, Heat Treating and Welding of Steel,* which are used as textbooks. Since 1936 he has served as metallurgical engineer, chiefly at the American Hoist & Derrick Co., St. Paul, and Western Foundry Co., Chicago. Mr. Campbell has spent considerable time in research on foundry core practice. He has presented many papers before the American Foundrymen's Society and has served on various committees of that and other societies.

♦ ♦ ♦

N. L. Mooneyham and **John C. Lunkes,** formerly associated with Velsicol Corp., Chicago, have formed the Trabon Co., with office at 122 South Michigan Ave., Chicago, to operate as manufacturers representatives for foundry supplies, chemicals, insecticides and aromatic solvents. Mr. Mooneyham has been general sales manager of Velsicol Corp., for 14 years and Mr. Lunkes has served as its director of purchases for 7 years.

♦ ♦ ♦

F. Kermit Donaldson, recently vice president and general manager, the Machined Steel Casting Co., Alliance, O., has been appointed executive vice president of the Steel Founders' Society of America (see p. 86). In his new capacity he succeeds Leslie C. Thellemann.

♦ ♦ ♦

John C. Alberts has been appointed factory sales representative of the Machine Division, the Osborn Mfg. Co., Cleveland, assigned to the northern Indiana, Illinois, Iowa, Wisconsin and Minnesota area, with headquarters in the Chicago office. Mr. Alberts, a graduate of Union College, joined the company about a year ago, following service with the U. S. Air Forces.

♦ ♦ ♦

Thomas E. Berry, formerly eastern seaboard regional sales manager, All-State Welding Alloys Co. Inc., White Plains, N. Y., has been appointed manager of domestic sales for the company's line of low-temperature welding and brazing alloys and fluxes.

♦ ♦ ♦

William J. Joyce Jr. has been named head of the research laboratories, Wayne Pump Co., Fort Wayne, Ind. Mr. Joyce was formerly chief engineer of research, Raybestos Manhattan Inc., Passaic, N. J., and previously headed the Product Development Division, American Optical Co., Southbridge, Mass. He was also in experimental engineering work with General Motors Corp., Detroit.

♦ ♦ ♦

Dan G. Caywood Jr. has been appointed representative of George Haiss Mfg. Co. Inc., New York, division of Pettibone Mulliken Corp., Chicago, to handle its line of conveyors and coal loaders in part of Massachusetts and all of Maine and New Hampshire. Mr. Caywood has had more than 20 years of experience in sale and service of material handling equipment.

♦ ♦ ♦

M. H. Blank has been appointed Detroit representative for Farrel-Birmingham Co. Inc., Ansonia, Conn., to handle sale of gears and gear units manufactured at the company's Buffalo plant. Mr. Blank, whose headquarters will be in Detroit, has been engaged in sales engineering activities as manufacturers' agent in that vicinity for the last few years.

♦ ♦ ♦

E. L. O'Meara Jr. has been appointed assistant chief engineer, Harbison-Walker Refractories Co., Pittsburgh. Mr. O'Meara has been associated with the company for more than 20 years.

♦ ♦ ♦

William Brown has been named foundry superintendent, Hetherington & Berner Inc., Indianapolis, Ind., succeeding **Louis Meyers,** who has been transferred to the company's sales department.

♦ ♦ ♦

F. D. Holben has been named foundry superintendent, Sterling Casting Co., Bluffton, Ind.

A. F. ANJESKEY

WILBUR MAYER

E. L. SHAUGHNESSY

H. L. CAMPBELL

BETTER CORES = BETTER CASTINGS

...Here are 4 Ways to Improve your Core Making—Use Krause Cereal Binders

Krause Cereal Binders are made under time-tested formulas — their uniform quality is laboratory controlled.

Get the binder advantages you need and want —specify TRUSCOR if you like light weight; AMERIKOR if you prefer the heavy weight. Order from the distributors listed below or direct from us.

CHAS. A. KRAUSE MILLING CO., Milwaukee 1, Wis.
World's largest dry corn millers.

CEREAL BINDERS

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Denver, Colo.
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Foundry Supplies Co.,
Chicago 16, Ill.
J. H. Hatten & Son, Aldan,
Delaware Co., Pa.
J. B. Hayes Co.
Birmingham, Ala.
Independent Foundry Supply
Co., Los Angeles 11, Calif.

Marthens & Co., Moline, Ill.
Carl F. Miller & Co.
Seattle 4, Wash.
Milwaukee Chaplet & Mfg.
Co., Milwaukee 4, Wis.
Pacific Graphite Works
Oakland 8, Calif.

Porter-Warner
Chattanooga 2, Tenn.
Smith-Sharpe Co.
Minneapolis 14, Minn.
Frederic B. Stevens, Inc.
Buffalo 12, N. Y.
Frederic B. Stevens, Inc.
Cleveland 14, Ohio

Frederic B. Stevens, Inc.
Detroit 26, Mich.
Frederic B. Stevens, Inc.
New Haven 11, Conn.
Western Industrial Supply Co.
Portland 14, Ore.

Quantity
PRODUCTION
of
GREY IRON CASTINGS

*

ONE OF THE NATION'S
LARGEST AND MOST MODERN
PRODUCTION FOUNDRIES

*

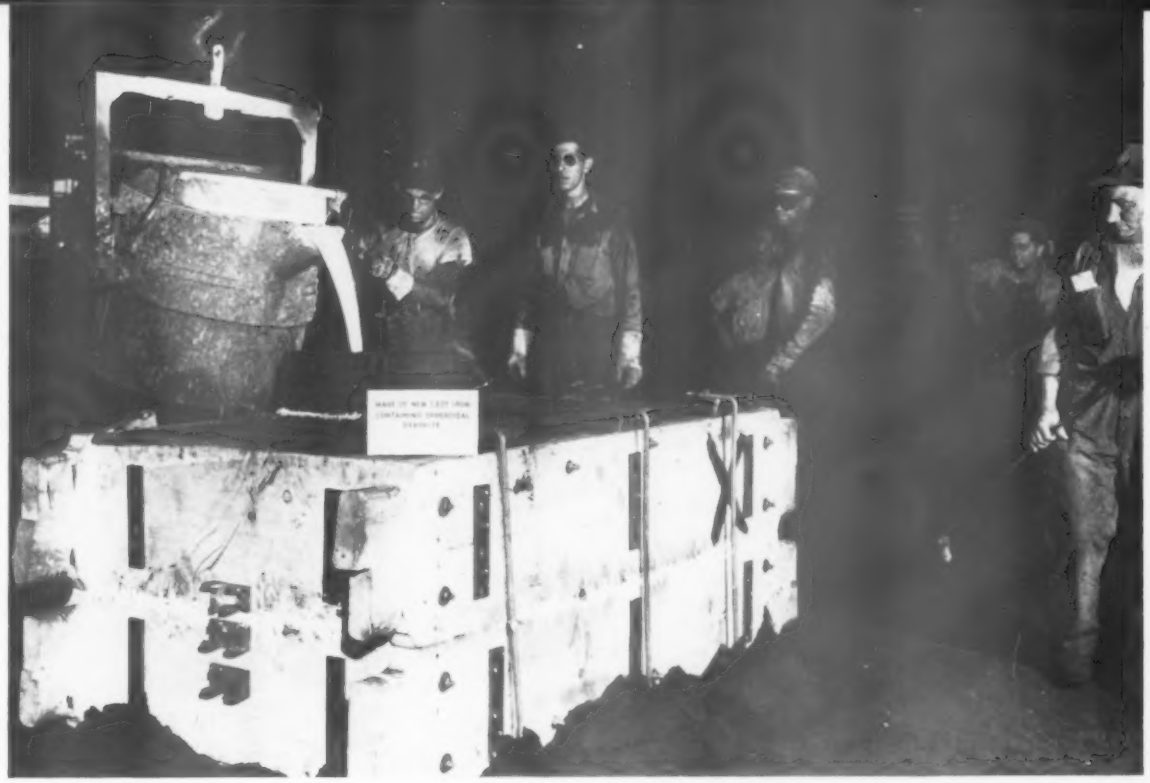
ESTABLISHED 1866

THE WHELAND COMPANY

FOUNDRY DIVISION

MAIN OFFICE AND MANUFACTURING PLANTS

CHATTANOOGA 2, TENNESSEE



Pouring iron treated with magnesium-nickel to produce spheroidal graphite

Describes Development of

DUCTILE CAST IRON

THE new engineering material, described as ductile cast iron, will contribute greatly as time goes on to the overall opportunity of the ferrous foundry industry, Don J. Reese, International Nickel Co., New York, predicted in Newark, N. J., recently. The name is derived from the fact that the material has considerable ductility in the as-cast condition.

Far from spelling the death-knell of any one branch of the ferrous foundry industry and under business conditions prevailing in late years, "the impact of these new techniques," he believed, "would be to up the ferrous foundry industry performance of 15,500,000 product tons in 1948 to, say 20,000,000 product tons."

He indicated that there would be some give and take within the industry. "The malleable foundry industry," he said, "which has been limited to sections which will cast white with irons in the range of 2.2 to 2.8 per cent carbon and 0.8 to 1.5 per cent silicon, usually sections of less than one inch but some times up to two inches or a fraction more than two inches, can now produce a malleable product irrespective of section.

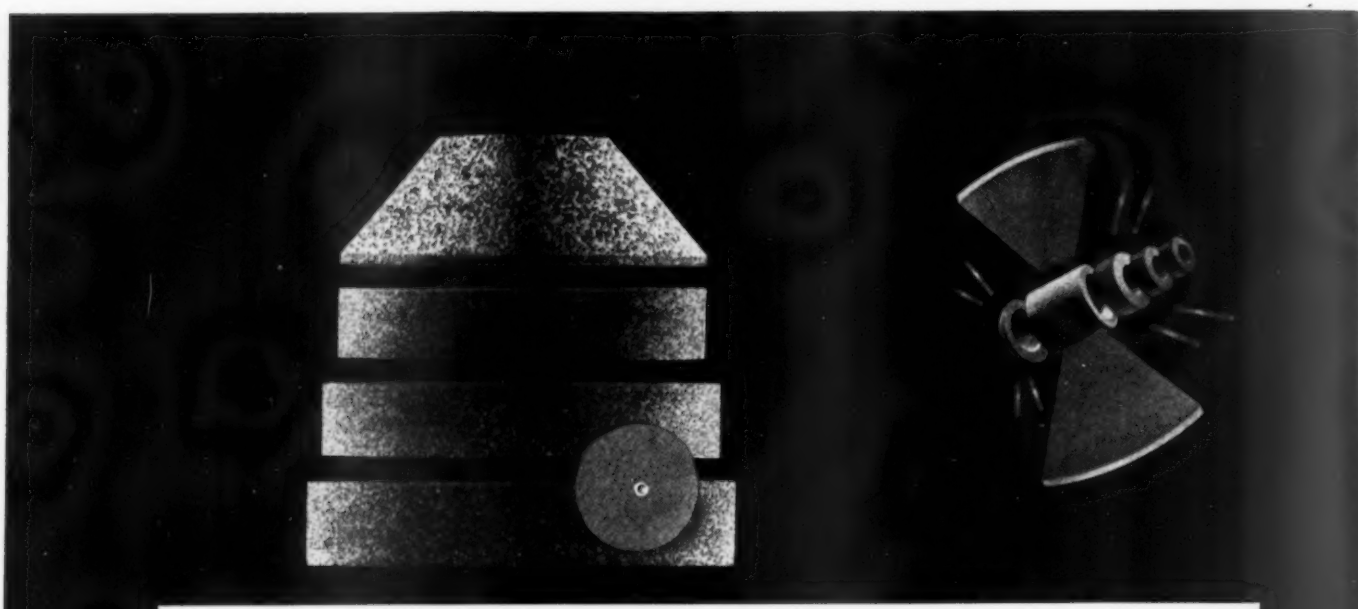
"There certainly could be some movement away from a malleable foundry to a gray iron foundry producing spheroidal carbon cast iron (the ductile cast iron in question)," he continued, "but there certainly could be a movement toward a malleable iron foundry using these new techniques for large sections and for economic reasons."

The impact of these developments, he believed, will open up a number of new avenues where cast iron can be used and will greatly fortify the foundry industry as a whole in competing with other industries.

Mr. Reese and his associate, Albert P. Gagnebin, were the featured speakers at the regular monthly meeting of the New Jersey Foundrymen's Association, at the Military Park Hotel, Newark, N. J., Monday evening, Feb. 21. Both devoted their remarks to the new engineering material, developed over a period of years in the research laboratories of the International Nickel Co., but

(*Continued on page* 114)

Engine crankshafts produced from ductile cast iron



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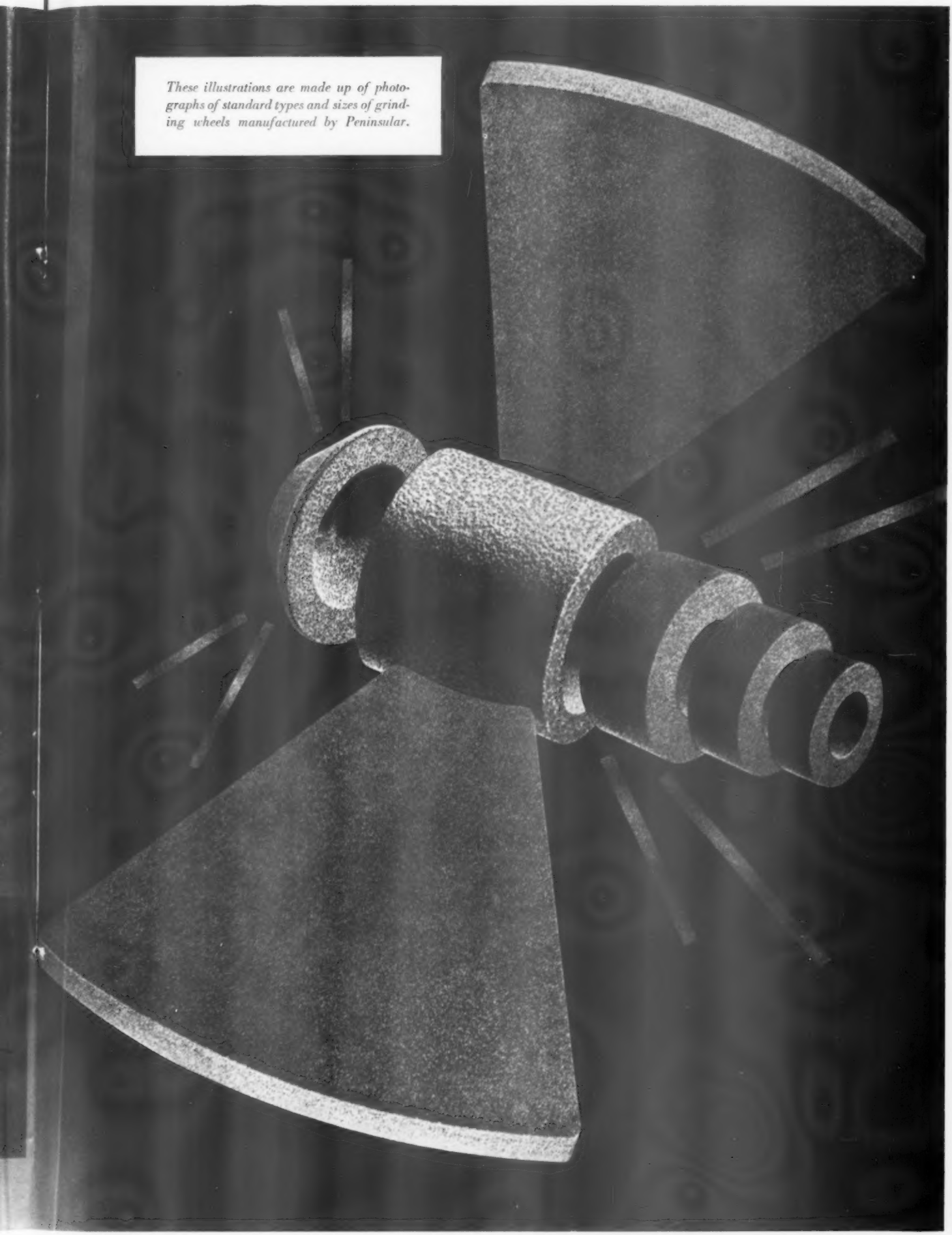

These illustrations are made up of photographs of standard types and sizes of grinding wheels manufactured by Peninsular.

(*Continued from page* 111)
now being produced commercially in a number of foundries. It was the first time it had come in for such detailed discussion before an association group.

The new material was described as combining the process advantages of gray cast iron, such as fluidity, castability and machinability, with the product advantages of cast steel, thus closing the gap between cast iron and cast steel. This material, it was pointed out, is characterized by a graphite structure in the form of spheroids, free from graphite in the flake form. It is claimed that the process for its application is a simple one and can be applied to all common cast iron compositions melted in the cupola or in any other kind of furnace. Physical properties, particularly high elastic modulus, high yield strength and ductility, suggest suitability of the material for many applications hitherto considered beyond the scope of cast iron.

Use Common Cast Iron

It was emphasized that no new equipment is required, that the production can be applied to common cast iron compositions. Production is based on the introduction into the iron of a small but effective amount of magnesium or a magnesium containing agent, such as nickel and magnesium alloy, it was pointed out. Magnesium may be added to cast iron without hazard and a spheroidal carbon iron can be produced every time.

In the as-cast condition it was described as a superior type of iron, with combinations of high strength and toughness available as well as high ductility if so desired. In addition to low melting point and good fluidity, the material has ready machinability and can be produced at moderate cost.

A variety of mechanical property combinations can be developed in ordinary compositions by heat treatment, it was pointed out. Simple annealing develops ferritic structures which show 15 to 20 per cent elongation with 65,000 to 75,000 psi tensile strength. Normalizing and tempering has developed a yield point of 116,000 psi, a tensile strength of 127,000 psi and 2.0 per cent elongation. Quench-and-draw treatments and additional alloying can be used for higher levels of strength wherever it may be required.

For pearlitic grades of cupola-melted material containing 3.2 to 3.6 per cent carbon, 1.8 to 2.8 per cent silicon, this new material provides in the as-cast condition a combination of 85,000 to 105,000 psi tensile strength with some ductility. In contrast to gray cast iron, its strength is only moderately affected by section thickness, it was said. For example, with a tensile strength of 90,000 psi in a 1-in. section, it ordinarily will develop 75,000 psi tensile strength in a 6-in. section. Damping capacity of ductile cast iron is low.

The new ductile cast iron behaves like steel and develops proportionality between stress and strain up to high levels of stress. Also, it was stated, phosphorus does not hinder the formation of spheroidal graphite, and it is possible to achieve tensile strengths of the order of 65,000 to

National Society for Crippled Children and Adults, 11 So. LaSalle St., Chicago 3, Ill.

75,000 psi with .65 per cent of phosphorus.

With respect to machinability, it was said that, in the as-cast condition, ductile cast iron up to 300 to 320 Brinell has been subjected without difficulty to a considerable variety of cutting operations, both under experimental and production conditions and including lathe turning, drilling, milling shaping and so on. It is as free machining as gray iron of the same hardness, but much superior to gray irons having equivalent transverse or tensile strengths, it was declared.

The new material can be readily arc welded by following the techniques established for gray irons. In using the modern types of weld rod for machinable welds, no difficulty has been developed from cracking, but there are some indications of greater hardenability along the weld margin, it was asserted.

The new process can be applied to practically all basic types of cast iron, including hypo- and hyper-eutectic, ferritic, pearlitic, acicular, martensitic and austentic varieties. There is a marked difference between the fracture appearance of gray cast iron and the spheriodal graphite irons. Cast iron has a dull, dark fracture, while the new material has a brilliant fracture, which has been termed steely because of its resemblance to that of a high carbon, coarse grained steel.

For general purposes a useful composition of the base iron for treatment with magnesium is as follows: Carbon, 3.2 to 3.6 per cent; silicon, 1.8 to 2.5 per cent; manganese, 0.3 per cent max.; phosphorus, 0.5 per cent max. Properties of the new material are relatively insensitive to carbon over the range of 2.5 to 4.0 per cent. In fact the strength and particularly the toughness improve with increasing carbon.

Silicon has a moderate effect over the range of 1.5 to 2.7 per cent and may be adjusted to suit the section thickness or some other metallurgical requirement. At higher levels of over 3.0 per cent it has its well known embrittling effect on ferrite and gradually reduces the strength and ductility.

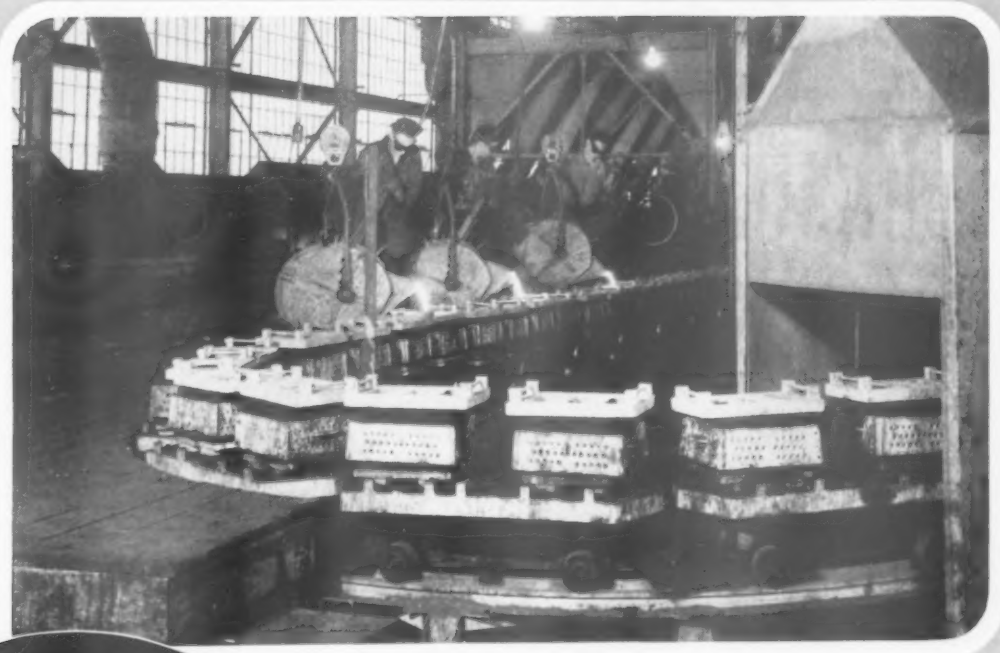
Phosphorus Increases Brittleness

Phosphorus, in amounts up to 0.2 per cent, gradually reduces the toughness and ductility. Larger quantities promote the usual embrittling phosphite network which results in moderately lower strength. Phosphorus does not hinder the formation of spheroidal graphite, however, and it is said to be possible to secure tensile strengths of the order of 65,000 to 70,000 psi with 0.65 per cent phosphorus. Properties of the new material are only moderately affected by section thickness.

Relative to casting properties, it was said that fluidity is about the same as gray iron of similar base composition, although feeding requirements are greater. It has a distinct tendency toward piping and inadequately fed sections may collapse inwardly instead of forming porous, internal shrinkages. This characteristic, it was pointed out, can facilitate the inspection of castings. Gating and risering should follow the practice for low carbon, high strength iron. A considerable variety of castings of complicated shape have been produced successfully of the spheroidal graphite iron with gates and risers designed for malleable iron.

The potential applications for this new material are obviously many and varied. The automotive, agricultural implement and railroad industries could apply it, both as-cast and heat treated, in component parts too numerous to detail. Machinery in general including machine tools, crank-

(*Concluded on page* 116)



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(*Concluded from page* 114)

shafts, pumps, compressors, valves and heavy industrial equipment, such as rolls and rolling mill housings, could readily utilize its high strength and rigidity. Its ductility may provide thermal shock resistance far greater than has been available in high carbon castings heretofore and suggests that superior performance might be obtained in items such as railroad car wheels and ingot molds. The superior resistance to growth and oxidation gives promise of its use in many engine, furnace and other parts used at elevated temperatures. Other products include pipe, fire hydrants, lamp posts, textile machinery, electrical machinery, paper machinery and marine equipment. Service data are gradually accumulating to determine the improved quality, weight reduction and economy available in specific applications.

Various foundries have already arranged licenses for the manufacture of the new cast iron under the pending patent applications of the International Nickel Co., and are now producing this new engineering material.

WISCONSIN DISTRICT FOUNDRYMEN

Meet at 12th Annual Conference

By FRANK G. STEINEBACH,
WILLIAM G GUDE, EARLE F. ROSS
and HOWARD C. TUTTLE
THE FOUNDRY

IN CONDUCTING their Twelfth Annual Regional Foundry Conference in Milwaukee Feb. 10-11, the Wisconsin Chapter of the American Foundrymen's Society and the University of Wisconsin, achieved another notable success in their long-time sponsorship of these outstanding events. More than 600 foundrymen, engineers, metallurgists, patternmakers, equipment manufacturers, materials suppliers and representatives of management, participated in the two-day meeting at Hotel Schroeder. Although Wisconsin and northern Illinois registration predominated, a number came from Indiana, Michigan, Ohio and Pennsylvania.

The program featured two luncheons, a banquet and 24 technical sessions, at times as many as six sessions being held simultaneously. Dr. J. M. Klotsche, president, State Teachers College, Milwaukee, addressed the banquet on Feb. 10, presenting an inspirational message on "The Destiny That Is Ours." Frank G. Steinebach, editor, THE FOUNDRY, Cleveland, was speaker at the first day's luncheon on the subject of "What's Ahead in the Foundry Industry," and at the second day's luncheon Arthur L. Grede, vice president, Grede Foundries Inc., Milwaukee, spoke on "My Impressions of Europe Today."

Wisconsin Chapter President R. C. Woodward, chief metallurgist, Bucyrus-Erie Co., South Milwaukee, presided at the opening session at which the speakers were AFS National President William B. Wallis, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, and M. O. Withey, dean of the College of Engineering, University of Wisconsin, Madison, Wis.

Just returned from a West Coast trip, President Wallis reported the foundry business outlook is for a slow first half and busy second half. American industry is making large capital expenditures but the expanded facilities will not be in production before 1950. The country probably will not feel the effect of the ECA program until fall. It was the opinion of Mr. Wallis that a leveling off in business activity is wholesome for the nation and that it may arrest the wage spiral which cannot continue without disaster.

Mr. Wallis highly commended establishment of the National Castings Council, stating that the industry is now aligned so that the experience in the war will not be repeated. The council has brought all elements of a $6 billion industry together for the first time. The castings industry, he pointed out, has lacked esprit de corps, and certainly it has not promoted its interests sufficiently.

Dean Withey outlined the expansion in metallurgical training and facilities under way at the University of Wisconsin. A new metals casting laboratory was opened last spring and its modern equipment is an important asset in improving scope and quality of instruction in metallurgical subjects. Enrollment in metallurgy is increasing slightly. The dean emphasized that the Foundry Educational Foundation has been of much assistance to the university; currently it is sponsoring 15 scholarships, 10 of senior grade and 5 of junior grade. Present plans are to add 5 scholarships to each group next year. The FEF program has stimulated the interest of students in foundry specialization.

The concluding luncheon meeting had Arthur L. Grede, vice president Grede Foundries Inc., Milwaukee, as speaker. W. W. Edens, Badger Brass & Aluminum Foundry Co., Milwaukee,

(*Continued on page* 118)

CONFERENCE PARTICIPANTS: Left to right—Frank G. Steinebach, editor, *The FOUNDRY*, luncheon speaker; Robert C. Woodward, Bucyrus-Erie Co., chapter chairman; William B. Wallis, national AFS president. (*Milwaukee Sentinel* photo)

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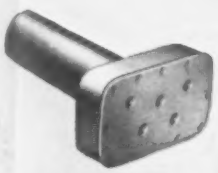

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TECHNICAL SESSION: Harry E. Gravlin, Ford Motor Co., Dearborn, Mich., leads a spirited discussion on "Sand, Metal or Men" at one of the gray iron technical sessions held during the Wisconsin conference

(*Continued from page* 116)

was chairman. Mr. Grede described a European trip he took last summer with a group from the Wisconsin Manufacturers Association. A large part of the time was spent in the Scandinavian countries where he reported worker efficiency in foundries visited has not yet recovered to prewar levels. Most plants employ a 48-hour week, and industry-wide bargaining with unions is a usual practice. Cement sand molds are widely used by the foundries.

At the first Technical group session, P. C. Rosenthal, associate professor, department of mining and metallurgy University of Wisconsin, discussed "Basic Principles Common to Foundry Melting Practice." Chairman and co-chairman, respectively, were David Fahlberg, Smith Steel Division, Grede Foundries Inc., and Dr. Harold Haase, research engineer, Marquette University, both of Milwaukee. Despite apparent and widespread differences in principles and practices there are nevertheless certain aspects common to all melting practices when these problems are viewed on an overall basis. With few exceptions, melting of metals and alloys is essentially a melt-down process with no attempt being made to refine.

Among the subjects discussed by Prof. Rosenthal were deoxidation; grain size control; gas removal by boiling, agitation or reaction; and avoidance of gas in castings. No amount of fluxing or slag control will rid a metal of inclusions which have been in solution and which precipitate during freezing. These, he said, must be controlled by the composition or by deoxidation treatment.

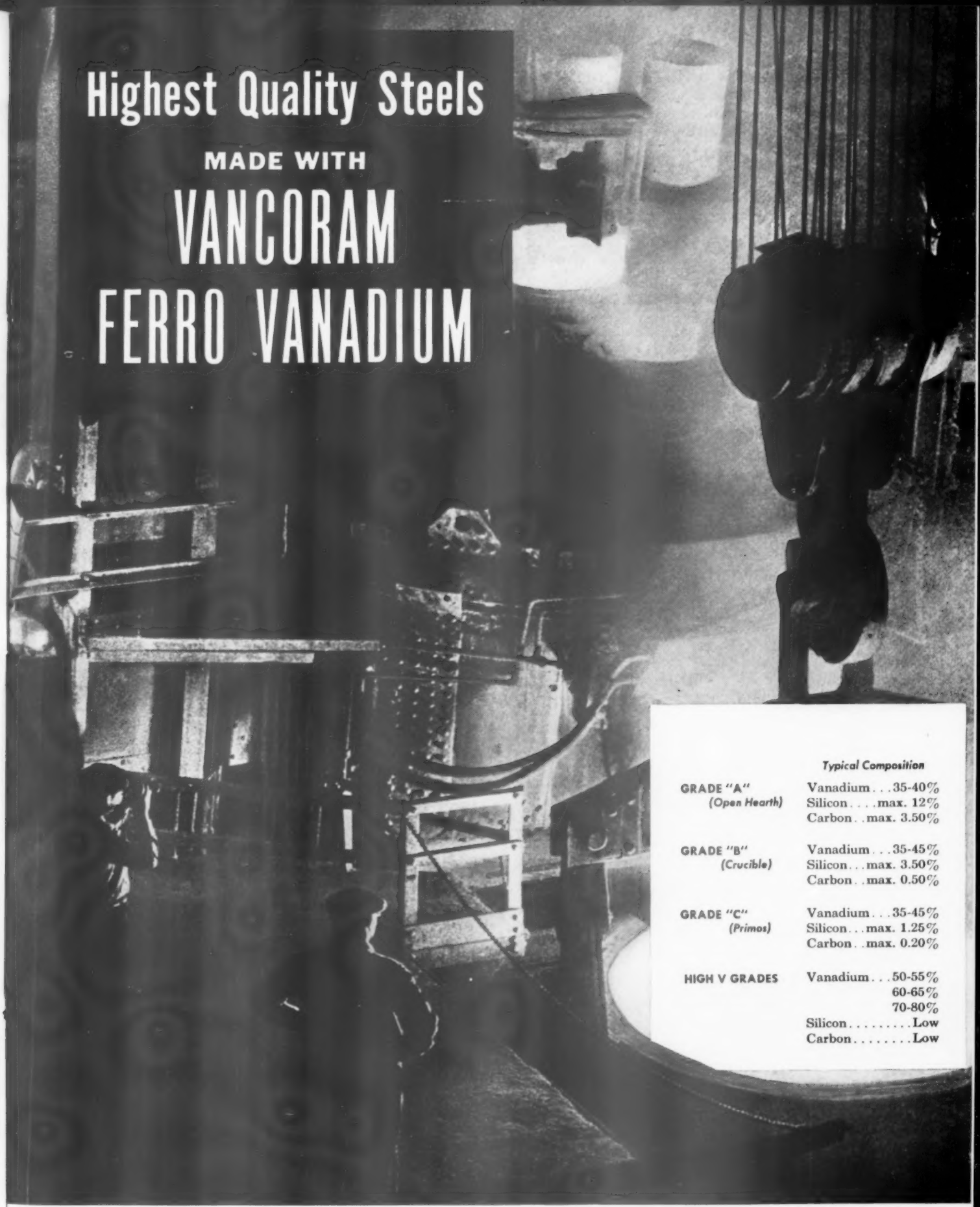
J. B. Caine, chief metallurgist, Sawbrook Steel Castings Co., Cincinnati, discussed "What Is Strength?" at the second Technical session. Dr. Harold Haase, Marquette University, was chairman and Norman F. Koch, metallurgist, Smith Steel Div., Grede Foundries Inc., Milwaukee, was co-chairman. Mr. Caine indicated that the long-accepted tension test yields only two properties that have any meaning in design, namely yield strength and modulus of elasticity. The so-called ductility components of a tension test, namely elongation and reduction in area, are meaningless in design.

Service ductility, if required, must be measured under conditions of stress concentration and dynamic shock loading, as in the notched impact test. Fatigue strength, the property that is most important in design, for all practical purposes has no relation to tensile properties and is a property with no ductility components. All four tests are objectionable from the control standpoint, for they are destructive. A nondestructive control for tensile yield strength is possible by means of a brinnell hardness test. No proven nondestructive control procedure is known at present for notched impact strength. The author's complete discussion of the subject appeared in the July and August, 1948, issues of THE FOUNDRY.

Practical aspects of photomacroga-

(*Please turn to page* 208)

Above—John Bing, Metropolitan Refractories Inc., New York, at conference registration desk. *Below*—General view at annual banquet. (Photos by W. V. Napp, Badger Firebrick & Supply Co.)



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GRADE "B" (Crucible)	Vanadium . . . 35-45% Silicon . . . max. 3.50% Carbon . . max. 0.50%
GRADE "C" (Primos)	Vanadium . . . 35-45% Silicon . . . max. 1.25% Carbon . . max. 0.20%
HIGH V GRADES	Vanadium . . . 50-55% 60-65% 70-80% Silicon . . . . . Low Carbon . . . . . Low

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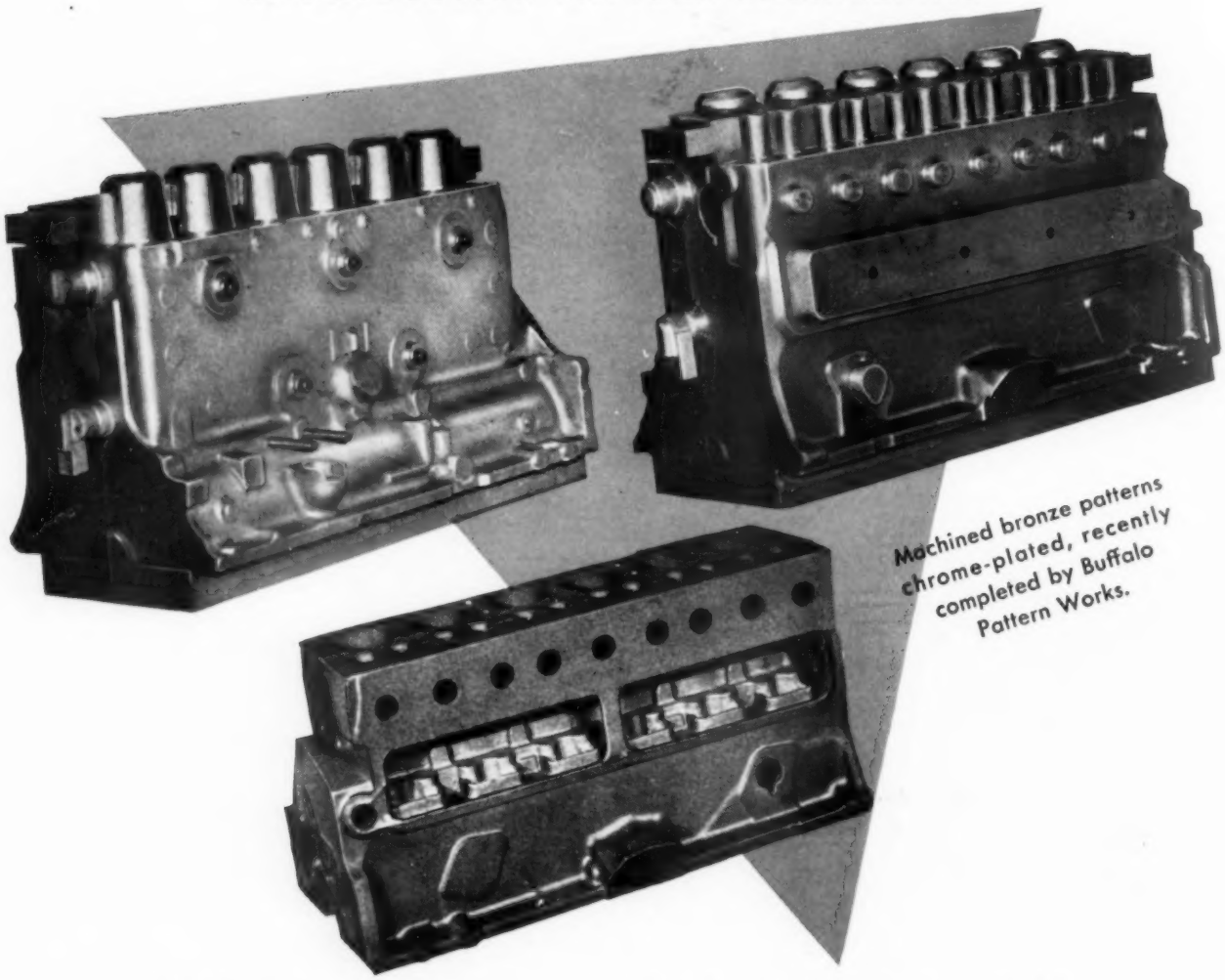

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BIRMINGHAM FOUNDRY CONFERENCE

Featured by Paper on Nodular Graphite Iron

By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY

OUTSTANDING feature of the seventeenth annual Foundry Practice Conference held by the Birmingham Chapter, AFS, was the presentation of data on the production of nodular or spherulitic graphite cast irons by use of magnesium. The meeting was held at the Tutwiler hotel, Birmingham, on Feb. 17, 18 and 19, with over 600 attending the various sessions.

At a luncheon held Feb. 17, W. B. Wallis, Pittsburgh Lectromelt Furnace Corp., and president of AFS spoke on activities of the society, and pointed out that the present slackening in business gives the foundryman a chance to iron out inefficiences in production methods, and to adapt technical developments which have occurred the last few years. At the annual banquet held Friday night, Feb. 18, Dr. John M. Gallalee, University of Alabama, Tuscaloosa, Ala., pointed out that education involves more than teaching the student the arts and sciences. It also includes inculcation of the basic principles upon which the country was founded and upon which it has progressed to its present high standards.

At the opening technical session under the chairmanship of Thomas H. Benners Jr., T. H. Benners & Co., Birmingham, C. K. Donoho, American Cast Iron Pipe Co., described the use of magnesium and magnesium alloys to produce gray iron with the graphite in nodular or spherulitic form. Advantage of magnesium over cerium is that it functions in gray irons with a wide range of carbon from 2.50 to 4.0 per cent, with a sulphur content as high as 0.09 per cent, and with phosphorus up to 0.70 per cent.

While excellent results are obtained with magnesium additions alone, care must be exercised in making the additions. Magnesium boils at 2030° F, is gaseous at molten iron temperatures, and burns explosively in air. However, even with a loss of probably 95 per cent of the magnesium, an addition of 1 per cent will provide sufficient retained magnesium in the iron to produce the desired end result—spherulitic graphite. Tensile strengths around 100,000 psi are obtained with low phosphorus irons when the retained magnesium is around 0.05 to 0.06 per cent.

In addition to magnesium alone, Mr. Donoho reported an investigation of the use of various magnesium alloys to ascertain whether a higher and more consistent recovery of magnesium and less violent reaction during addition could be obtained. Nickel-magnesium and copper-magnesium were found most suitable. Those containing 20 per cent or less magnesium gave a substantial decrease in violence of reaction. In all cases the irons must be inoculated with 0.40 per cent Si, otherwise the resulting product is hard and has a mottled structure. Use of a graphitizing inoculant causes reversion to a flake graphite structure.

Effect of magnesium additions decreases with holding time as in the case of inoculating procedures, but Mr. Donoho stated that he believed the iron could be held in the ladle for 10 minutes without losing the effect of the magnesium. He also found that annealing magnesium treated iron at 1650° F decreased the tensile strength around 24 per cent but the elongation was increased at least 1½ times. For example, an average of two bars showed as cast a tensile strength of 101,750 psi and an elongation of 7.85 per cent. After heat treatment at 1650° F for one hour, the tensile strength average was 76,500 psi and the elongation 19.45 per cent.

In conclusion Mr. Donoho men-

(*Please turn to page* 166)

Attendance at the annual banquet exceeded the capacity of the Terrace room. Dr. John M. Gallalee, president, University of Alabama, was guest speaker

AROUND Detroit

By A. H. ALLEN
Detroit Editor
THE FOUNDRY

Heat treatment seen desirable where machinability of gray iron is important. . . . Blasting successful in cleaning core plates. . . . General Motors has new pig iron, coke source

WHERE machinability of gray iron is an important factor —and that applies with particular emphasis to the automotive industry—microstructural control to develop a ferritic matrix in the iron by suitable heat treatment offers interesting possibilities, despite the fact heat treatment of gray iron has found only limited use. This was the gist of comment by Carl F. Joseph, Central Foundry Division, General Motors Corp., at a recent "production clinic" of the Society of Automotive Engineers in Detroit. The clinic or panel discussion, on the general subject of heat treatment, was one of eight held at the three-day National Passenger Car Body and Production meeting, which drew an attendance of 1200. The event is an annual affair and has come to be second in importance to the annual meeting of the SAE, held in Detroit in January.

On the panel at which Mr. Joseph spoke were three other metallurgists —L. B. Rosseau of Ajax Electric Co., speaking on salt bath heat treatments; A. W. Herbenar of Ohio Crankshaft Co., discussing induction heating for forging and heat treatment; and O. E. Cullen of Surface Combustion Corp., presenting an analysis of atmospheres for heat treating furnaces. Panel leader was R. G. McElwee of Vanadium Corp. of America who, along with three other panel members, handled questions from the audience. The latter were Harold Bates, Fairfield Mfg. Co.; E. H. Stillwill, Dodge Division of Chrysler Corp., and E. D. Wiard, Gorham Tool Co.

This type of technical meeting is relatively new for the SAE at least, although in recent years a number of other societies have used variants of it, such as "quiz the experts," "stump the specialists," etc. It makes for a much better air of informality and tends to draw out audience participation to a much greater extent.

To return to Mr. Joseph, he prefaced his remarks by pointing out the most important requirements for gray iron castings: Sufficient strength to meet service requirements; sound structure free from gas holes, shrinkage and porosity; and a material free of hard spots and chilled edges, so that it is readily machinable. Complaints from machining departments over poor machinability of castings, resulting in excessive tool wear and difficulty in meeting producton schedules, have mounted since the end of the war. Foundries have been faced, of course, with tremendous problems in respect to raw material quality and uniformity, resulting in a considerable degree of nonuniformity in products sent to machining departments. The trouble is not necessarily the fault of the foundrymen, although perhaps poor metallurgical control often may be a contributing factor. Nevertheless, foundrymen get the blame, and scrap arising in machining operations usually has been charged back to the foundry.

Heat Treatment Not New

As mentioned before, heat treatment of gray iron is not new, although it has not been practiced to any great extent. Mr. Joseph observed that production of soft gray iron always has been regarded as a straight cupola proposition. If the proper raw materials were charged and the melt properly supervised, the end product was a readily machinable casting. At least that was once the situation, and there are signs of improvement in raw materials which will bring back the old order.

To improve machinability of a gray iron casting, said Mr. Joseph, it is necessary to examine the structure of the matrix. In an as-cast part the structure of the matrix is often sorbitic or sorbitic-pearlitic in nature. The brinell hardness will run around 217-228. The particular casting produced from an iron which has been inoculated to prevent the occurrence of chilled edges might not machine with difficulty. If, however, the machine shop demands a soft gray iron, easily machinable, it is evident the matrix must be changed.

The most effective way to do this is to heat treat before machining. Composition of the metal with respect to silicon and carbon, naturally, greatly affects the time and temperature of annealing, but in most plain carbon gray irons a temperature between 1300 and 1400° F for 45 minutes, followed by slow cooling, will lower the brinell from 228 to around 140. At this hardness, if chilled edges are absent, combined carbon is almost entirely absent and machinability is at its best.

Cost of annealing may be considered out of line, except that the results obtained usually are more than justified, in the opinion of Mr. Joseph. Drill test machinability usually is 100 per cent. In some cases machine output has been increased twofold, eliminating the need for additional machine capacity to meet schedules. Tool life on some jobs has been increased more than three times, meaning fewer man-hours required for tool maintenance and lower tool costs. All these factors must be weighed carefully against the cost of annealing equipment, fuel and manpower. It may well be that in the larger shops, handling high volume, such a procedure could prove distinctly profitable.

* * *

SOME unusual work is reported in progress at one of the large automotive foundries with regard to the cleaning of core plates. Formerly they were cleaned chemically in various types of caustic solutions and rinses. Experiments were started to clean the plates by subjecting them to a high-pressure blast of mixed rice grain husks and ground corn cobs. It is understood preliminary tests of the blasting treatment appear highly successful, with appreciable savings indicated over the chemical solution method.

* * *

ARRANGEMENTS have been concluded by General Motors Corp. for a "substantial tonnage" of pig iron and foundry coke with Pittsburgh Coke & Chemical Co., Pittsburgh. A five-year contract has been negotiated to start in September. The Pittsburgh company will install a new battery of 35 coke ovens at its Neville Island plant, increasing by 50 per cent the rated capacity of 450,000 tons a year. Twenty of the new ovens will be financed by General Motors, although the Pittsburgh company will operate them. The contract to supply pig iron contemplates outside blast furnace support, enabling Pittsburgh Coke to maintain normal pig iron shipments to its present customers.

"if it's mounted on Springs why don't it bounce?"

This fellow may sound a bit skeptical about Spring-Mounted Roller Conveyer, but that's not exactly so. Like other men who work with Foundry Conveyers, he knows that Roller Conveyer applied in this industry must have extra weight and strength built into it. He has seen a lot of too-light conveying equipment beaten to pieces in a short time under severe foundry service. That is why he is interested in Spring-Mounted construction. He is learning that when springs are pre-compressed to normal roller capacity, the load does not *bounce*, and the conveying surface is *smooth* and *even*. When the rollers are overloaded, the *springs* rather than the *bearings* of the rollers absorb the shock. Spring-Mounted Roller Conveyer is a Mathews development to meet the requirements of heavy industry for Roller Conveyer which will operate under severe conditions with a minimum of maintenance attention and expense, and it is establishing quite a reputation for itself by doing just that.

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OBITUARY

JEFFREY M. TAYLOR, 70, retired secretary-treasurer, National Foundry Association, Chicago, died Feb. 15. Mr. Taylor, a graduate of Northwestern University and a member of the Chicago Bar, began work as assistant to Henry Hansen, one-time editor of THE FOUNDRY. During the few years he served in that capacity he worked intermittently for the National Foundry Association,

JEFFREY M. TAYLOR

and was made its eastern representative in 1905. He was appointed secretary-treasurer in 1912, and held that position until his retirement in 1944.

* * *

David R. Wilson, 74, former president, Willys-Overland Motors Inc., Toledo, O., and one of the founders of Wilson Foundry & Machine Co., Pontiac, Mich, died Mar. 11, in Pontiac. Mr. Wilson and his brother, the late Charles B. Wilson, founded the Wilson Foundry & Machine Co. in 1914, which became a principal supplier of gray iron castings to Willys-Overland Motors.

* * *

George J. Haberkorn, 81, retired foundryman, died Feb. 6, at his home in Milwaukee, his native city. Milwaukee foundries with which Mr. Haberkorn had been associated included the former Thomas Brass Co., Loeffelholz Co., and the old National Brake & Electric Co., where he was foreman of the brass foundry at the time of his retirement in 1931.

* * *

Hugh S. Robertson, 55, vice president, Harbison-Walker Refractories Co., Pittsburgh, died Feb. 21, while vacationing in Guatamala.

* * *

Einar A. Anderson, 48, general manager, Twin City Brass & Aluminum Foundry Co., Minneapolis, died Feb. 18. A native of Sweden, Mr. Anderson went to St. Paul at the age of 8 and attended St. Paul College of Law there.

* * *

Frederick W. Pascoe, 65, for almost 50 years associated with Westinghouse Electric Corp. at Cleveland, died Mar. 9, at his home in that city. A native of England, Mr. Pascoe went to Cleveland at the age of 3. He joined Westinghouse in 1899 at the Cleveland foundry, where he later became superintendent.

* * *

Winfred W. Elliott, founder and president, Elliott Mfg. Co., Binghamton, N. Y. died Jan. 26, following a long illness. Mr. Elliott had been active in the flexible shaft industry since 1898. He was a partner in the Binghamton Flexible Shaft Co. from 1920 to 1932, when he established Elliott Mfg. Co.

* * *

Alvin B. Einig, 64, general manager and director, Motch & Merryweather Machinery Co., Cleveland, died there Feb. 27. Mr. Einig joined the company following graduation from Case Institute of Technology. During the war he served as administrative officer of the Tools Division, War Production Board.

* * *

John J. Creighton, 59, formerly assistant secretary and treasurer, General Steel Castings Corp., Granite City, Ill., died Feb. 12, at his home in Drexel Hill, Pa. Mr. Creighton had served as traffic manager of the company's plant at Eddystone, Pa.

* * *

Arthur S. Nichols, 48, vice president, Illinois Clay Products Co., Chicago, died Feb. 18 in that city following an extended illness. He had been associated with the company 23 years.

* * *

Gustaf L. Kollberg, 70, retired manager, blower and compressor department, Allis-Chalmers Mfg. Co., Milwaukee, died Feb. 2. Mr. Kollberg had been an engineer there for 40 years.

* * *

Harry V. Seth, for more than 45 years eastern division sales manager, Pittsburgh Steel Foundry Corp., Glassport, Pa., died Feb. 13. Mr. Seth had retired in 1946.

* * *

Ralph H. Grier, 62, president and son of the founder, R. D. Grier & Sons Co., Salisbury, Md., foundry and machine shop, died there Feb. 18.

* * *

Garland R. Johnson, retired vice president, Lynchburg Foundry Co., Lynchburg, Va., died Feb. 22.

Meeting Calendar

Apr. 6—Detroit Chapter of American Foundrymen's Society, congress of foundry experience, Rackham Memorial Bldg., Detroit.

Apr. 11-15—American Society for Metals, sixth Western Metal Congress and Exposition, Shrine Auditorium, Los Angeles

Apr. 14—National Castings Council, annual meeting, Hotel Cleveland, Cleveland

Apr. 18-20—National Open Hearth Steel Committee, American Institute of Mining and Metallurgical Engineers, annual meeting, Palmer House, Chicago.

Apr. 18-20—Midwest Power Conference, Sherman Hotel, Chicago

Apr. 19-20—Magnesium Association, annual meeting, Edgewater Beach Hotel, Chicago

Apr. 22 — Malleable Founders' Society, western sectional meeting, Palmer House, Chicago.

May 1—Non-Ferrous Founders' Society, directors' meeting, St. Louis

May 2-5—American Foundrymen's Society, annual convention, St. Louis

May 12-13—Instrument Society of America, annual spring meeting, Royal York Hotel, Toronto

May 16-18—Industrial Manufacturers Association, annual meeting, the Cavalier, Virginia Beach, Va.

May 20—Malleable Founders' Society, eastern sectional meeting, New York

May 27—Malleable Founders' Society, western sectional meeting, Palmer House, Chicago

June 9-10 — Steel Founders' Society of America, industrial relations meeting, Drake Hotel, Chicago

June 16-17—Malleable Founders' Society, annual meeting, Homestead Hotel, Hot Springs, Va.

June 27-28—American Foundrymen's Society, chapter chairmen's conference, Chicago

June 27-July 1—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

July 28-29—American Foundrymen's Society, annual directors meeting, Chicago

Oct. 10-14—American Society for Testing Materials, Pacific Coast meeting, Fairmont Hotel, San Francisco

Oct. 13-14 — Steel Founders' Society of America, fall meeting, Ambassador Hotel, Los Angeles

Oct. 13-15—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 17-21—American Society for Metals, metal congress and exposition, Public Auditorium, Cleveland

Oct. 27-28—Gray Iron Founders' Society, annual meeting, Edgewater Beach Hotel, Chicago

Nov. 3-5—Meehanite Metal Institute, annual meeting, Hotel Carter, Cleveland

Nov. 15-16—Michigan Regional Foundry Conference sponsored by the Michigan AFS chapters, Michigan State College, East Lansing, Mich. (Tentative)

Nov. 15-17 — National Foundry Association, annual meeting, Waldorf-Astoria Hotel, New York

Nov. 25-26—New York Regional Conference, sponsored by New York AFS chapters

1950

(Tentative Schedule)

Feb. 8-9 — Steel Founders' Society of America, annual meeting, Edgewater Beach Hotel, Chicago

Oct. 12-13—Foundry Equipment Manufacturers' Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 19-20—Gray Iron Founders' Society, annual meeting, Netherland Plaza Hotel, Cincinnati

Nov. 8-10—National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

Pouring it on — and no interruptions — straight line production. In this foundry they're doing things in a big way—are pleased with the result — PROFIT! For modern, mechanized foundry operations — single units or complete systems — call in a Jeffrey engineer.

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Complete Line of Material Handling, Processing and Mining Equipment

FOUNDRY Developments

By EDWIN BREMER

INVESTIGATION of application of magnesium in the production of spherulitic nodular gray irons by C. K. Donoho, American Cast Iron Pipe Co., shows that effect of the magnesium disappears as the holding time in the molten state is extended. Cerium acts similarly. Hence, it is advisable for those who are contemplating some experiments in that field to see that the magnesium or magnesium alloy is added just a short time before pouring. Also the melt should be inoculated with ferrosilicon to provide an addition of 0.40 per cent, Si, or a mottled structure will result. Along that line one wonders what effect would be obtained by pouring the treated iron into a hot mold. Possibly it might result in an iron free from mottle, or even a product similar in structure to that resulting when annealed or heat treated.

* * *

DEVELOPED by General Electric's General Engineering and Consulting Laboratory, an electron diffraction instrument is being used to study layers of metal less than a quarter-millionth of an inch thick in the search for better metals and lubricants for jet engines. With the instrument it is claimed that engineers can detect in a few seconds natural films which emanate from the metal itself and chemical changes produced on the surface by lubricants—chemical changes not visible under the microscope and which could not be detected by such equipment.

* * *

COMPREHENSIVE report of an investigation at the National Bureau of standards on eye-protective glasses recently has been published. Entitled "Spectral Transmissive Properties and Uses of Eye-protective Glasses" by Ralph Stair (Circular C471), it covered a study of about 200 glasses intended for use as sun glasses or for special industrial operations where injurious amounts of ultraviolet, luminous, or infrared radiant energy are present. Extensive consideration was given to the elimination of glare, distortion of colors of objects, use of glasses for driving at night, standardization of glasses for out-of-doors and industrial purposes, and the spectral-transmissive properties of glasses for use under various types and intensities of radiant energy.

* * *

IT SEEMS as though there is nothing new under the sun—at least in foundry practice. Not too long ago someone made the statement that in the future machines for ramming sand in molds would be supplanted by a gravity system of dropping sand from a height into the flask. Maker of that statement probably will be as surprised as we were when he consults the February, 1907 issue of THE FOUNDRY, as it contains complete description of a bucket elevating system in which sand compacted in the buckets was dropped from a height of 12 ft into the flask.

* * *

ADVANTAGES gained in using oxygen for manufacture of stainless steels, according to J. E. Harrod, Carnegie-Illinois Steel Corp., Chicago, in a paper presented at the Electric Furnace Steel Conference held recently in Pittsburgh, are: 1—A high percentage of stainless steel scrap can be used; 2—a high percentage of chromium from scrap is obtained; 3—the oxygen-chromium reaction is exothermic, thus providing additional heat which lowers the power consumption per ton; 4—control of chromium content is better, and 5—control of quality is better, particularly in straight chromium grade. Oxygen also can be used in the manufacture of Hadfield manganese steel in much the same manner, according to Mr. Harrod.

* * *

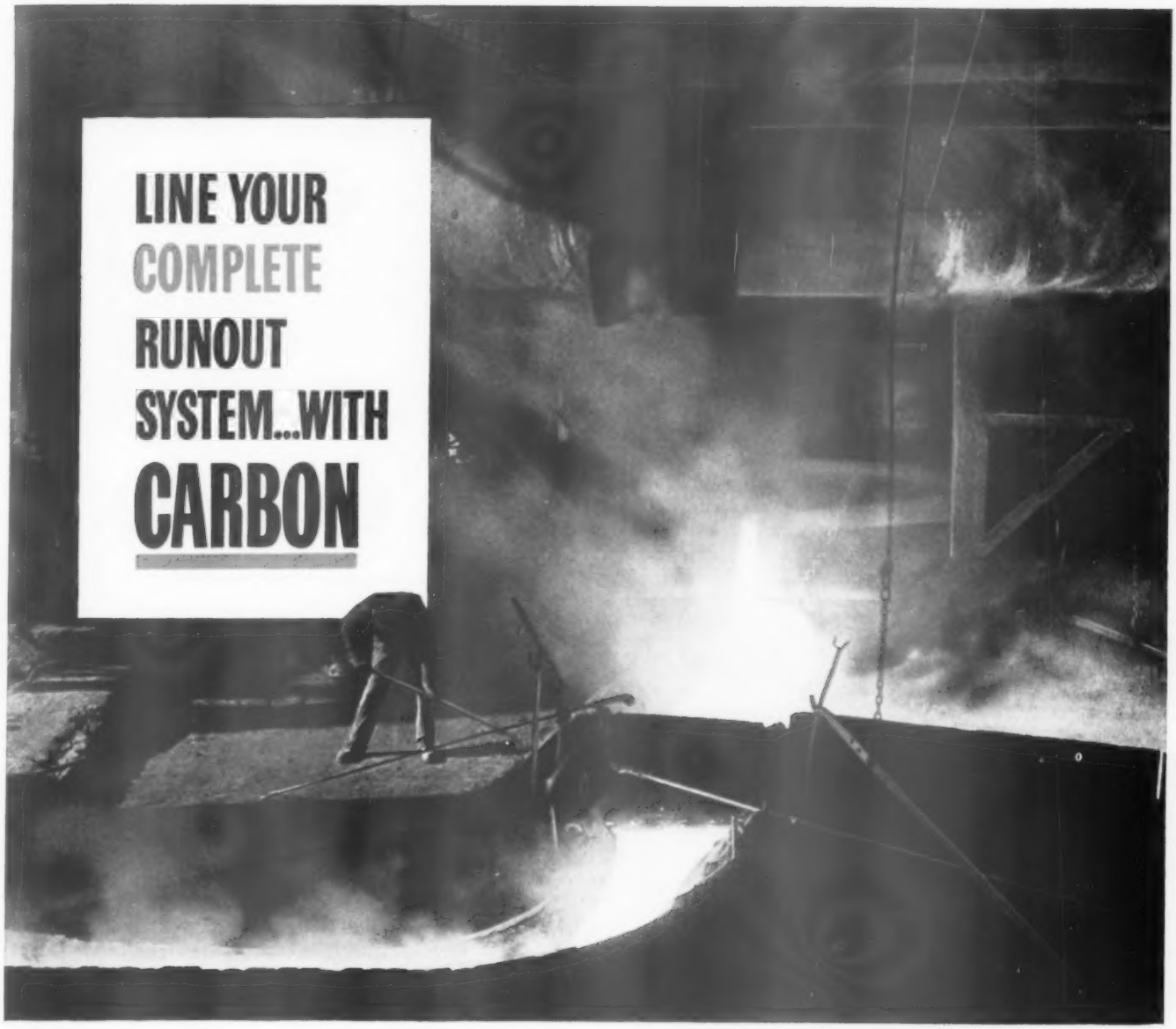
SINCE Jan. 1, 1949 the National Bureau of Standards, Washington, has been using definitions of the International Temperature Scale of 1948 both in its own research program and calibrating instruments for other scientific and industrial purposes. New scale was adopted at Paris by the Ninth General Conference on Weights and Measures in October, 1948, and was the first revision in 21 years. Changes in the scale include revising the melting point of silver from 960.5° C to 960.8° C, adoption of a new value (1.438 cm-deg) for the constant C_2 in the radiation formulas, and use of Planck's radiation formula instead of Wien's for calculating temperatures above the gold point.

* * *

NATIONAL Bureau of Standards has published two sets of charts of interest to those using or handling hydrogen, oxygen, or nitrogen gases. One set shows the compressibility factors of those gases, and the other shows the quantities delivered by commercial cylinders. Pressure range of the compressibility charts is from 0 to approximately 6000 psi at temperatures from —50° to +150° F while commercial-cylinder charts cover temperatures between —10° to +130° F, and a pressure range which varies with the temperature between 1300 and 2800 psi. Copies of the charts may be secured from Superintendent of Documents, Government Printing Office, Washington 25, for 25 cents.

* * *

DEFINITE trend toward production of aluminum castings by the permanent mold and die casting methods is evident in figures reported by the Bureau of the Census for shipments the last few years. Shipments in 1948 were approximately 80,000 tons for permanent mold castings, 70,000 tons for sand castings and 60,000 tons for die castings. Compared with 1946 these represent a decrease of 2 per cent for sand castings, an increase of 6 per cent for permanent mold castings and an increase of 75 per cent for die castings. Since the last war year, 1945, shipments of sand castings have dropped 35 per cent while permanent mold and die castings shipments have risen 50 per cent and 70 per cent, respectively.



● "National" carbon-block linings have for years been doing a fine job in blast furnace runout troughs —between taphole and skimmer plate.

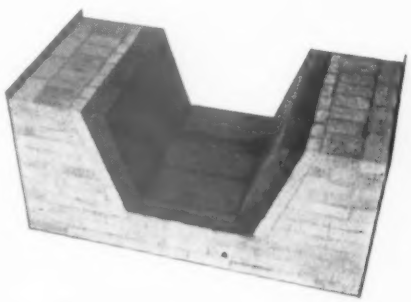
Why stop there?

Why not use carbon linings for the entire system, from furnace to ladle, and in the lead-in spouts of the pig machine as well? Carbon-block construction, shown at right, is recommended to the skimmer plate. Carbon bricks are most practical for the rest of the troughs.

Why use carbon?

Carbon outlasts other trough linings by months, even years. It is unaffected by thermal shock. Hot metal will not stick to carbon; so, if any skull is formed in the trough, it is readily removed. Furthermore, if you desulphurize in the trough, you'll find that carbon is highly resistant to desulphurizing agents.

Here is the recommended construction for a carbon-block trough between taphole and skimmer plate. Dark section is carbon. Light section is firebrick.



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Students of Missouri School of Mines and the St. Louis chapter group. Front row, left to right: John Williamson, M. A. Bell Co.; Dr. Dan Eppelsheimer; Ben Gross, Key Co.; George Mellow, Liberty Foundry Co.; Webb Kammerer, Midvale Mining & Equipment Co.; A. L. Hunt, National Bearing Division; R. B. Parker; Walter Onstott, Ramapo Ajax Division; E. J. AuBuchon, M. A. Bell Co.; Joe Srebalus, American Manganese Steel Division; Roger W. Batchelder, National Bearing Division; Norman Peukert, Carondelet Foundry Co.

St. Louis District Chapter

EQUIPS SCHOOL FOUNDRY

By A. L. HUNT
St. Louis District Chapter Chairman
National Bearing Division
American Brake Shoe Co.

EQUIPPING a new foundry for the Missouri School of Mines and Metallurgy at Rolla, Mo., in order that a course in foundry practice might be organized there, was accomplished recently by the membership of the St. Louis District Chapter of the American Foundrymen's Society. Equipment, valued at $7500, was delivered to Rolla on Jan. 12 for installation there.

At the opening of the current chapter season, several members of the St. Louis group visited meetings of the AFS student chapter at the Missouri School of Mines. The enthusiasm both of the student body and of faculty members made it evident that a course in foundry instruction would be welcome. It was also felt that such a course would be of considerable value to the industry in the district, inasmuch as none of the schools in the metropolitan St. Louis area offers such instruction.

Front row, left to right: John Mitchell, student chapter president at Rolla, Mo.; W. B. Wallis, national AFS president; Dr. Dan Eppelsheimer, Missouri School of Mines and Metallurgy. Back row: Dr. A. W. Schlechten; Associate Prof. J. A. Reynolds; W. C. Pickles, National Bearing Division, American Brake Shoe Co.

Through the co-operation of the St. Louis District Chapter's members, practically everything in the way of equipment necessary to organize a shop for foundry instruction was assembled for delivery to the school. Some of the units are shown in the accompanying illustrations. Dr. A. W. Schlechten, head of the Department of Metallurgy at Rolla, made arrangements for installation of the equipment. He also indicated the course in foundry practice would be established as a requisite for graduation not only from the Metallurgical School, but also from the Mechanical Engineering School. Likewise, authorization has been granted to employ a full-time instructor to teach the foundry course. Dr. Dan S. Eppelsheimer, professor of metallurgical engineering at Rolla and faculty advisor of the student chapter there, has been particularly active in pushing the foundry project to completion.

(*Concluded on page* 130)

Third in a series of
Unusual Abrasive
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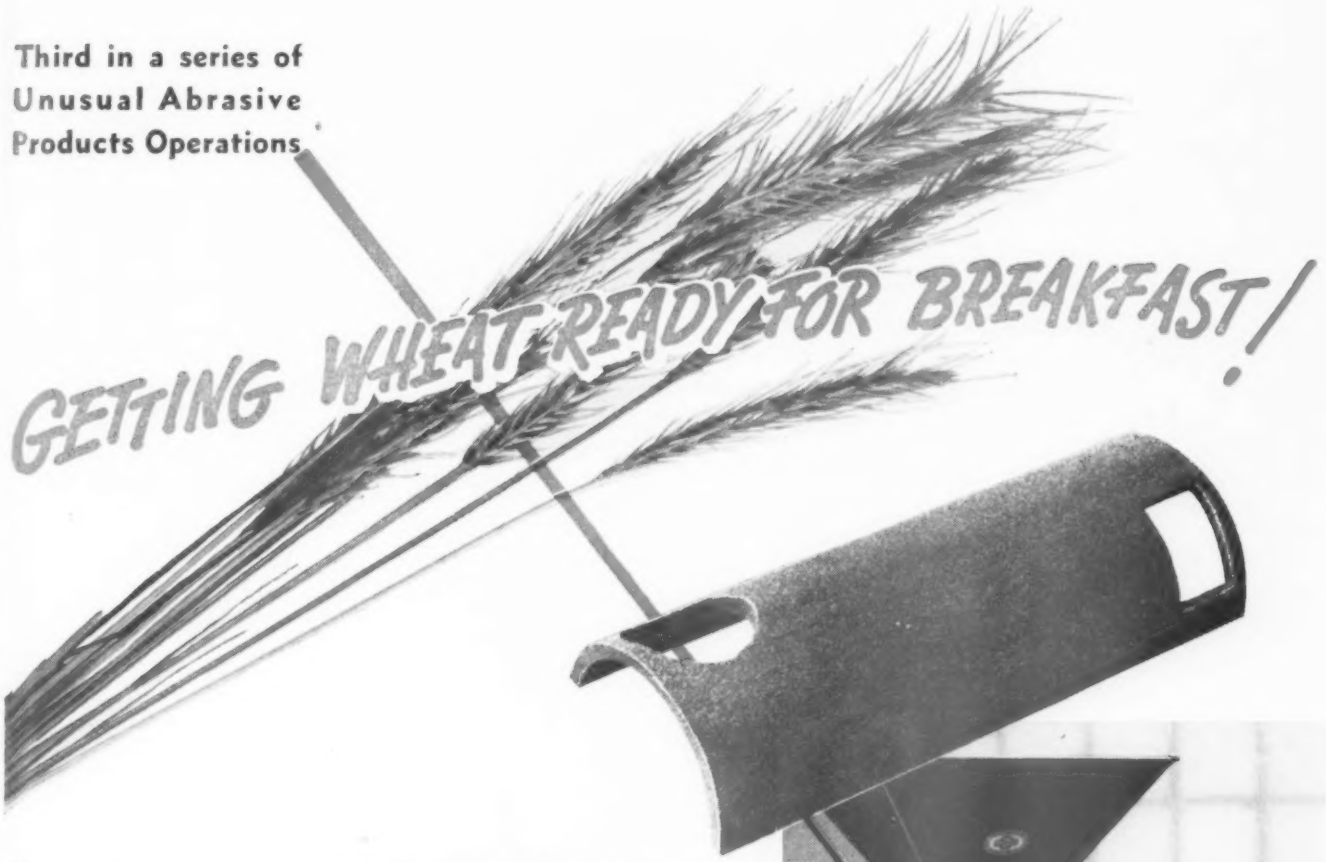

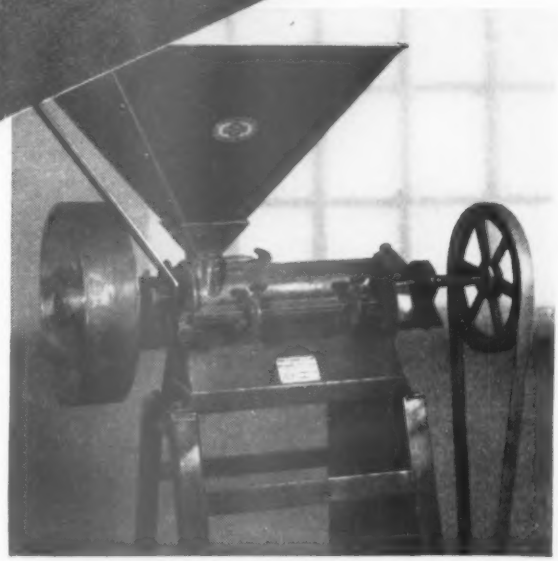

Photograph, Courtesy of Marcus Mason & Co., Inc.

● Bay State abrasive shell liners are used in hulling machines for removing the bran and shining the wheat grain before it is made into puffed wheat.

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Top Performance Consistently Duplicated

Some of the foundry equipment furnished by St. Louis district foundrymen shown with students at the Rolla, Mo., school

(*Concluded from page* 128)

A group from the St. Louis District Chapter journeyed to Rolla Jan. 12, the day the equipment was delivered, to attend the AFS student chapter dinner meeting that evening. R. B. Parker, assistant to the president of the American Brake Shoe Co., was the principal speaker, his topic being "Planning Tomorrow's Management." The meeting was attended by some 35 students, faculty members and St. Louis foundrymen. Interest of the students was evidenced by their keeping three of us answering questions for at least an hour after the meeting was over.

The following day, Jan. 13, 25 students together with Dr. Eppelsheimer, Prof. Dave Walsh and Prof. James Reynolds visited St. Louis. During the morning they visited the plant of the National Bearing Division, American Brake Shoe Co., and were guests there for lunch. In the afternoon, George Mellow, treasurer of the Liberty Foundry Co. and industrial advisor of the student chapter, conducted the visitors through the company's plant. The day was concluded with the group's attending the meeting of the St. Louis District Chapter and being its guests at dinner. Dr. Curtis L. Wilson, dean of the Missouri School of Mines and Metallurgy, also was present, and his personal thanks to the members of the chapter for completion of the project were most gratifying.

To Prepare Market Research Sources

Department of Commerce plans publication of a 1949 edition of "Market Research Sources," designed to provide information useful in analyzing markets, establishing market potentials, setting sales quotas and laying out advertising campaigns. The department is seeking to expand listings to include research groups which have developed new sources of marketing information since the last edition was published in 1940. A form showing type of descriptive material desired for the listing will be sent on request to groups engaged in compiling appropriate information. Business firms, advertising agencies, universities, state and local government agencies, and others who have not been represented in the past, are urged to communicate with the Marketing Division, Department of Commerce, Washington, or to the nearest department field office, if they do not receive one of the questionnaires being sent out.

NEW! DoALL HIGH-SPEED BANDSAWS

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DoALL, known for many years as the world's headquarters for precision bandsaws, now offers four 36" high-speed models in the low-cost range, to meet the special requirements of foundries, sheet-metal shops and woodworkers.

They are available in set speeds of 2,000 to 10,000 fpm., direct or belted drive; or in variable speeds of 1,000 to 5,000 or 2,000 to 10,000 fpm., with Speedmaster drive. Cast-iron or aluminum wheels on Timken roller-bearing spindles. Two-way tilting table; high-speed, double-insert-type saw guides with large anti-friction thrust bearings. Can be furnished with foot-operated, hydraulic brakes for both wheels. Throat capacity 35¾"; work-height capacity 20" under saw guide and 14" at column. Blade capacity up to 2". Write for complete information.

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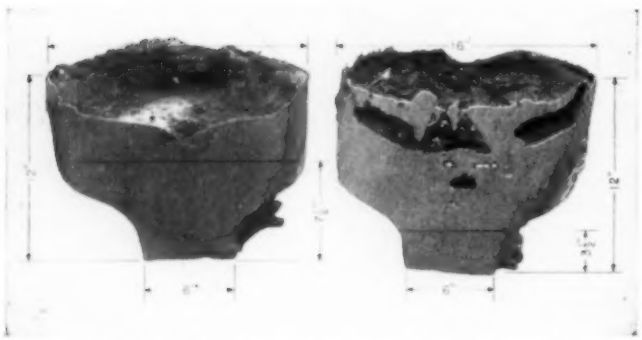
SUPERIOR PERFORMANCE in Casting Production of SOFFEL'S CARBON-FREE LIQUIDIZER *PROVED* by Amazing Sales Record

A sensational sales increase of more than half a million pounds of Soffel's Carbon-Free Liquidizers last year proves again the superior performance of these products in improving the quality and cutting the costs of all types of casting. All together more than 1,670,000 pounds of Soffel's Carbon-Free Liquidizers were used in foundries and ingot production last year.



Riser on left contains twice as much sound metal.

These risers, made in the same mold, illustrate how Soffel's Carbon-Free Liquidizer produces sounder castings and saves metal. The riser on the left, on which Carbon-Free Liquidizer was used, contains more than twice as much sound metal as the riser on the right on which a common carbonaceous pipe eliminator was used. It is readily seen from this that the use of Soffel's Carbon-Free Liquidizer permits substantial reductions in size of risers.

Carbon Free Liquidizer Controls Shrinkage

Soffel's Carbon-Free Liquidizer keeps feeding metal in a molten state at least 50% longer. It increases the yield per heat, eliminates porosity and cavities and increases the density of castings. Since it is entirely free of any form of carbon, it completely eliminates any carbon pick-up without changing the composition of the steel, iron, or non-ferrous metals.

Carbon-Free Liquidizer is a powder. It is used to cover the metal in feeder heads or risers as soon as the metal rises about halfway. It creates a slow, exothermic action which prolongs the fluidity of the feeding metal and also acts as an insulating material against heat loss. Soffel's Carbon-Free Liquidizers provide superior performance, lowering casting costs and raising quality. It is available in various types for use with every cast metal.

300 lb. aluminum bronze bearing cap cast with THERMOTOMIC feeding ring core under riser. Note small feeder opening which facilitates removal of riser from casting, resulting in greatly reduced cleaning costs. Heads and risers are removed without cutting or burning.

Thermotomic* Reduces Size of Feeding Heads, Risers

Thermotomic is a new exothermic compound which maintains the fluidity of casting metal, making it possible to use feeding heads which are shorter, more compact and have very small feeder openings. This permits easy removal of heads and gates and greatly reduces cleaning and finishing costs. Thermotomic also acts to eliminate shrink cracks or porosity and improves grain structure and tensile strength of castings.

Thermotomic is a dry powder which is mixed with water and molded into any desired shape, then baked in the same manner as ordinary sand cores. It is used as inserts under risers or as a facing application in sections of the mold where it is desirable to maintain fluidity of the feeding metal. To obtain ideal directional solidification of the casting, Soffel's Carbon-Free Liquidizer No. 5 should be used in conjunction with Thermotomic Compound.

There is a Thermotomic compound available for use with all ferrous and non-ferrous metals.

* Patent Pending

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Pittsburgh Metals Purifying Co.

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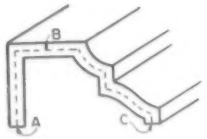
THE FOUNDRY DATA SHEET

PERIMETER OR GIRTH TABLE FOR DETERMINING THE WEIGHT OF IRON CASTINGS

Example No. 1—Find the weight of an irregularly shaped casting as shown in Fig. 1. Its perimeter or girth measured with a piece of cord along A, B, C, the center of its section is 27 inches; the thickness of the casting is ½ inch; the total length of casting is 6 feet 2 inches.



From the table, below:

27-in. girth x ½-in. thick per ft length = 42.12 lb

Therefore

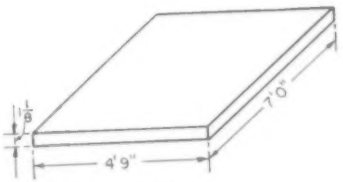
27-in. girth x ½-in. thick per 6 ft = 42.12 × 6 = 252.72

and

27-in. girth x ½-in. thick per 2 in. = 42.12 ÷ 6 = 7.02

Weight of casting = 252.72 lb + 7.02 lb = 259.74 lb.

Example No. 2—Find the weight of a cast iron plate as shown in Fig. 2. From the table, below:



29-in. girth x 9/16 in. thick = 50.90 lb per ft
28-in. girth x 9/16 in. thick = 49.14 lb per ft
57-in. girth x 9/16 in. thick = 100.04 lb per ft

Therefore 57-in. girth x 1⅛-in. thick = 200.08 lb per ft or
57-in. girth x 1⅛-in. thick = 100.04 lb × 2 = 200.08 lb per ft
Weight of casting = 200.08 lb × 7 = 1,400.56 lb

Example No. 2 is given to show how the table may be extended to thickness of metal not given in it.

THICKNESS OF METAL IN INCHES

Weight in Pounds per 1 Foot in Length

Girth, in.	1/16	1/32	3/16	7/32	1/4	9/32	5/16	11/32	3/8	13/32	7/16	15/32	1/2	17/32	9/16	19/32	5/8	Girth, in.
¼	0.098	0.122	0.146	0.171	0.195	0.219	0.244	0.268	0.293	0.317	0.341	0.366	0.390	0.415	0.439	0.463	0.488	¼
½	0.195	0.244	0.293	0.341	0.390	0.439	0.488	0.536	0.585	0.634	0.683	0.731	0.780	0.829	0.878	0.926	0.975	½
1	0.39	0.49	0.585	0.683	0.78	0.878	0.975	1.07	1.17	1.27	1.37	1.46	1.56	1.658	1.76	1.85	1.95	1
2	0.78	0.98	1.17	1.37	1.56	1.76	1.95	2.15	2.34	2.54	2.73	2.93	3.12	3.315	3.51	3.71	3.90	2
3	1.17	1.46	1.76	2.05	2.34	2.63	2.93	3.22	3.51	3.80	4.10	4.39	4.68	4.97	5.27	5.56	5.85	3
4	1.56	1.95	2.34	2.73	3.12	3.51	3.90	4.29	4.68	5.07	5.46	5.85	6.24	6.63	7.02	7.41	7.80	4
5	1.95	2.44	2.93	3.41	3.90	4.39	4.88	5.36	5.85	6.34	6.83	7.31	7.80	8.29	8.78	9.26	9.75	5
6	2.34	2.93	3.51	4.10	4.68	5.27	5.85	6.44	7.02	7.61	8.19	8.78	9.36	9.95	10.53	11.12	11.70	6
7	2.73	3.41	4.10	4.78	5.46	6.14	6.83	7.51	8.19	8.87	9.56	10.24	10.92	11.60	12.29	12.97	13.65	7
8	3.12	3.90	4.68	5.46	6.24	7.02	7.80	8.58	9.36	10.14	10.92	11.70	12.48	13.26	14.04	14.82	15.60	8
9	3.51	4.39	5.27	6.14	7.02	7.90	8.78	9.65	10.53	11.41	12.29	13.16	14.04	14.92	15.80	16.67	17.55	9
10	3.90	4.88	5.85	6.83	7.80	8.78	9.75	10.73	11.70	12.68	13.65	14.63	15.60	16.58	17.55	18.53	19.50	10
11	4.29	5.36	6.44	7.51	8.58	9.65	10.73	11.80	12.87	13.94	15.02	16.09	17.16	18.23	19.31	20.38	21.45	11
12	4.68	5.85	7.02	8.19	9.36	10.53	11.70	12.87	14.04	15.21	16.38	17.55	18.72	19.89	21.06	22.23	23.40	12
13	5.07	6.34	7.61	8.87	10.14	11.41	12.68	13.94	15.21	16.48	17.75	19.01	20.28	21.55	22.82	24.08	25.35	13
14	5.46	6.82	8.19	9.56	10.92	12.29	13.65	15.02	16.38	17.75	19.11	20.48	21.84	23.21	24.57	25.94	27.30	14
15	5.85	7.31	8.78	10.24	11.70	13.16	14.63	16.09	17.55	19.01	20.48	21.94	23.40	24.86	26.33	27.79	29.25	15
16	6.24	7.80	9.36	10.92	12.48	14.04	15.60	17.16	18.72	20.28	21.84	23.40	24.96	26.52	28.08	29.64	31.20	16
17	6.63	8.29	9.95	11.60	13.26	14.92	16.58	18.23	19.89	21.55	23.21	24.86	26.52	28.18	29.84	31.49	33.15	17
18	7.02	8.78	10.53	12.29	14.04	15.80	17.55	19.31	21.06	22.82	24.57	26.33	28.08	29.84	31.59	33.35	35.10	18
19	7.41	9.26	11.12	12.97	14.82	16.67	18.53	20.38	22.23	24.08	25.93	27.79	29.64	31.49	33.35	35.20	37.05	19
20	7.80	9.75	11.70	13.65	15.60	17.55	19.50	21.45	23.40	25.35	27.30	29.25	31.20	33.15	35.10	37.05	39.00	20
21	8.19	10.24	12.29	14.33	16.38	18.43	20.48	22.52	24.57	26.62	28.67	30.71	32.76	34.81	36.86	38.90	40.95	21
22	8.58	10.73	12.87	15.02	17.16	19.31	21.45	23.60	25.74	27.89	30.03	32.18	34.32	36.47	38.61	40.76	42.90	22
23	8.97	11.21	13.46	15.70	17.94	20.18	22.43	24.67	26.91	29.15	31.40	33.64	35.88	38.12	40.37	42.61	44.85	23
24	9.36	11.70	14.04	16.38	18.72	21.06	23.40	25.74	28.08	30.42	32.76	35.10	37.44	39.78	42.12	44.46	46.80	24
25	9.75	12.19	14.63	17.06	19.50	21.94	24.38	26.81	29.29	31.69	34.13	36.56	39.00	41.44	43.88	46.31	48.75	25
26	10.14	12.68	15.21	17.75	20.28	22.82	25.35	27.89	30.42	32.96	35.49	38.03	40.56	43.10	45.63	48.17	50.70	26
27	10.53	13.16	15.80	18.43	21.06	23.69	26.33	28.97	31.59	34.22	36.86	39.49	42.12	44.75	47.39	50.02	52.65	27
28	10.92	13.65	16.38	19.11	21.84	24.57	27.30	30.03	32.76	35.49	38.22	40.95	43.68	46.41	49.14	51.87	54.60	28
29	11.31	14.14	16.97	19.79	22.62	25.45	28.28	31.10	33.93	36.76	39.59	42.41	45.24	48.07	50.90	53.72	56.55	29
30	11.70	14.63	17.55	20.48	23.40	26.33	29.25	32.18	35.10	38.03	40.95	43.88	46.80	49.73	52.65	55.58	58.50	30
31	12.09	15.11	18.14	21.16	24.18	27.20	30.23	33.25	36.27	39.29	42.32	45.34	48.36	51.38	54.41	57.43	60.45	31
32	12.48	15.60	18.72	21.84	24.96	28.08	31.20	34.32	37.44	40.56	43.68	46.80	49.92	53.04	56.16	59.28	62.40	32
64	24.96	31.20	37.44	43.68	49.92	56.16	62.40	68.64	74.88	81.12	87.36	93.60	99.84	106.08	112.32	118.46	124.80	64

If the above weights, which are for cast iron, be multiplied by 1.08 they will give the weight of similar castings in alloy iron or steel; by 1.154 will give the weight of similar castings in brass; by 1.54 will give the weight of similar castings in lead; by 0.36 will give the weight of similar castings in aluminum

CALCULATION OF QUANTITY OF HEAT REQUIRED TO MELT NONFERROUS METALS

When a piece of metal is melted, it absorbs a quantity of heat. In our system this unit is the British thermal unit, abbreviated Btu. One Btu is the quantity of heat necessary to raise one pound of water one degree Fahrenheit. As heat is applied, the temperature of the metal increases proportionately until a point is reached at which the metal begins to melt. The amount of heat necessary to raise the metal to this temperature depends upon a property of that metal known as its specific heat, which is defined as the number of British thermal units required to raise the temperature of one pound of metal one degree Fahrenheit.

For example, the specific heat of pure copper is about 0.10 (Btu's per pound per degree Fahrenheit) and for pure aluminum it is about 0.25. Since the melting point of copper is 1981° F and that of aluminum is 1220° F, it will require about 198 Btu's (1981 x 0.10) to raise the temperature of a pound of copper from 0° F to its melting point, whereas it will require about 305 Btu's (1220 x 0.25) to put a pound of aluminum through the same cycle.

While the metal is absorbing heat energy from the fuel it is constantly expanding at a uniform rate in proportion to the increase in temperature. The amount of expansion per inch per Fahrenheit degree rise in temperature is called the thermal coefficient of linear expansion. This varies for each metal and alloy.

For copper-base alloys, the expansion is in the range of 9 to 12 millionths (0.000009-0.000012) of an inch per inch. For example, take a piece of metal that has a coefficient of 10 millionths of an inch per inch. If it is 10 inches long, and if it is increased in temperature 500° F, the length will increase 0.05 inches. The expansion, of course, takes place in all directions so that an increase in volume also occurs. For the copper-base alloys, this increase in volume is in the rate of 4 to 8 per cent, depending on the composition of the metal.

When the temperature of the metal reaches the point where melting begins (solidus point), a very remarkable reaction takes place. The additional application of heat causes little or no rise in temperature. The reason for this is the fact that heat energy is also used to change the physical state of the metal from a solid to a liquid. The amount of heat (Btu's) per pound required to change the metal from a solid to a liquid (with the temperature remaining the same) is called its latent heat of fusion. This also varies for each metal and alloy. The latent heat of fusion for pure copper is about 91 Btu's per pound, while that of aluminum is about 167 Btu's per pound.

There is no change in the temperature of a pure metal while it is being transformed from a solid to a liquid, however, in an alloy there may be comparatively small rise in temperature. From the instant at which the first crystal melts (solidus point), to the instant at which the metal is completely molten (liquidus point), both solid crystals and liquid metal are present. At this state the metal is in a plastic state. The interval in temperature between the solidus and liquidus is call the solidification range. It varies from a few degrees for some alloys to several hundred for others.

The reason that an alloy increases in temperature at this point and a pure metal does not, is the fact that in the alloy there can be a change in composition between liquid and solid. The liquid that is formed keeps increasing in temperature while at the same time the crystals are absorbing heat to change from the solid to the liquid state. The net result is a rise in temperature which is small in comparison to the rise from room temperature to the melting point of the metal.

Although the solidification range for most copper-base alloys is generally less than two hundred degrees Fahrenheit, there is a comparatively large increase in the volume of the metal while it is changing from a solid to a liquid. The increase in volume of copper-base alloys during liquefaction is about 4.5 to 9 per cent, depending on the composition of the metal.

Once the liquidus temperature has been passed, additional heat applied to the metal keeps it increasing in temperature while also increasing in volume. Both of these changes are proportional to the heat input. The amount of heat necessary to increase the temperature is again dependent on the specific heat of the metal, which, however, has a slightly different value in the temperature range.

The specific heat for copper at the liquidus temperature is about 0.10 and for aluminum it is about 0.26. Therefore, to increase the temperature from the liquidus to say 200° F above it, would require about 20 Btu's (200 x 0.10) for copper and about 52 Btu's (200 x 0.26) for aluminum.

To calculate the amount of heat necessary to raise the temperature of one pound of copper or aluminum from 0° F to a point 200° F above their melting points, it is only necessary to add up the Btu figures given previously. If the heat absorption were one hundred per cent efficient, a pound of copper would require 309 Btu's while a pound of aluminum would require 534 Btu's under the same conditions. Contrary to popular belief, it requires more heat to melt a pound of aluminum than it does to melt a pound of copper.

The change in volume of the metal after its temperature has passed the liquidus point is not as high in the previous cases. At about 200° F above the liquidus, the increase in volume for most copper base alloys is in the range of 1.5 to 2 per cent.

A knowledge of the previous considerations will permit one to calculate melting efficiency and also to study the volume changes in metals under conditions of varying temperatures. The problems of shrinkage and shrinkage porosity are directly associated with the changes in volume of the metal, and a thorough knowledge of these phenomena is necessary if it is desired to solve such problems in the foundry.

From "Copper-base Casting Alloys," published by Federated Metals Division, American Smelting & Refining Co., New York 5.

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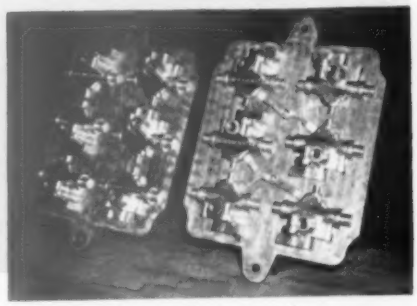
High precision patterns and core boxes, as produced by IPW for today's progressive foundries, will be a prime essential in any shop which attempts to meet the demands of the new era.

The precision which every foundry will take for granted tomorrow is here today in Industrial Pattern Works' patterns and core boxes. Sound pattern control simply means the use of IPW all-machined properly engineered high precision patterns that produce dimensionally accurate castings. In turn, this means a sharp reduction in foundry time and machine time—in foundry scrap and machine scrap. These savings are important today! They will be increasingly important as we get further into the Automatic Age.



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ACTIVITIES OF FOUNDRY *Groups*

Central Indiana

PLANS for the 1949 national AFS convention were reviewed by Alfred Hilbron, convention and exhibits manager of the AFS, at the Feb. 7 meeting of Central Indiana Chapter of the AFS held at the Athenaeum, Indianapolis. Mr. Hilbron also outlined a plan to encourage the sale of the society's publications by local chapters as a means of raising treasury funds. At the chapter directors' meeting, Allen J. Reid, district sales manager, General Refractories Co., Indianapolis, was appointed chairman of the committee to investigate the proposed publication selling plan.

The meeting later divided into two sections with William M. Ball, Jr., metallurgical and foundry consultant, R. Lavin & Sons, Chicago, speaker for the nonferrous group and J. A. Bowers, melting superintendent, American Cast Iron Pipe Co., Birmingham, addressing those interested in ferrous foundry practice.

V. J. Sedlon, president, Master Pattern Co., Cleveland, addressed approximately 135 members and guests of the Central Indiana Chapter on the subject, "Modern Pattern Equipment" at the monthly meeting of the chapter held Mar. 7, at the Athenaeum, Indianapolis.

Mr. Sedlon's talk was illustrated with a series of slides and was followed by a question and answer period which attracted great interest. The speaker was introduced by Leo Rice, pattern foreman at the International Harvester Co., Indianapolis Works, who served as technical chairman for the meeting.

The meeting was preceded by a directors' business meeting at which Robert Langsenkamp, chapter chairman, announced the appointment of Jack W. Giddens, foundry metallurgist, International Harvester Co., Indianapolis, as vice chairman to fill the unexpired term of Howard Creps, formerly of Frank Foundries Corp., Muncie, Ind., who recently resigned. —*William K. Mitchell.*

Tennessee

AN interesting talk on "Foundry Coke" was presented by J. A. Bowers, melting superintendent of the American Cast Iron Pipe Co., Birmingham, at the Jan. 21 meeting of the Tennessee Chapter of the AFS.

Mr. Bowers reviewed several papers which have been published on the subject. In reporting on experiments run several years ago to determine the value of bottom coke, he stated that it was found this coke had no different effect on the metalloids during melting and they have been using it in place of new coke ever since. Tests also revealed wet coke better than dry, and so sprays have been installed over coke rack cars and all coke is wet thoroughly.

Mr. Bowers emphasized the need to conserve foundry coke and suggested the following ways to do so: Proper experienced supervision by person understanding entire melting procedure; alert control of temperature, slag, melting speeds, etc.; good coke bed and proper height; knowing maximum weight of iron charge for each cupola; importance of charging cupola evenly; better selection of materials in metal charges; balance between air into tuyeres and coke; saving metal temperature by insulating and preheating ladles; saving

(*Continued on page* 138)

CENTRAL INDIANA Chapter of the AFS celebrated national officers' night Feb. 7 at the Athenaeum, Indianapolis. Shown above, left to right, are; Carl Schopp, Link-Belt Co., Indianapolis; Al Hilbron, AFS convention and exhibits manager, Chicago, who outlined 1949 national convention plans; J. A. Bowers, American Cast Iron Pipe Co., Birmingham, who addressed the ferrous section of the meeting; William M. Ball, R. Lavin & Sons Co., Chicago, who addressed the nonferrous section, and Robert Langesenkamp, Langesenkamp-Wheeler Brass Works, Indianapolis, chapter chairman

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(*Continued from page* 136)

cupola drop coke; wetting coke before charging; preheating blast; clean bright tuyeres during whole melting period; using correct amount of flux; enriching blast with oxygen.—*Carl A. Fischer Jr., Fischer Supply Co.*

Cleveland Non-Ferrous

TWENTY-SIX members and guests were present at the Feb. 24 meeting of the Cleveland Chapter of the Non-Ferrous Founders' Society held at the Cleveland Athletic Club.

Officers elected to serve for the coming year are: Chairman, Dr. R. T. Maneely, Hoffman Bronze & Aluminum Co.; vice chairman, R. R. Burton, Holland Trolley Supply Co.; secretary, Charles Kates, Union Brass & Copper Co., Ashland, O.; publicity and program director, W. S. Beckinbaugh, Proof Machine & Brass Foundry Co.

William E. Harding, assistant regional director of the wage and hour division, Department of Labor, was the principal speaker and he discussed wage and hour regulations. The average employer recognizes the need of time clocks for hourly rated employee records, but for the salary employee who does not qualify as a bona-fide executive, he pointed out, it is unlawful not to have for reference a complete record of hours worked, time started and stopped.—*E. J. Metzger, Wellman Bronze & Aluminum Co.*

Central Illinois

SPEAKER at the Feb. 7 meeting of Central Illinois Chapter of the AFS held at the Jefferson Hotel, Peoria, Ill., was Carl F. Joseph, technical director, Central Foundry Div., General Motors Corp., whose topic was, "Control of Materials and

(*Continued on page* 140)

WISCONSIN Chapter of the AFS held sectional sessions at its meeting Jan. 14 at Hotel Schoeder, Milwaukee. Fig. 1, left to right, are: Robert C. Woodward, Bucyrus-Erie Co., chapter chairman, and A. F. Pfeifer, Allis-Chalmers Mfg. Co. Fig. 2: R. A. Witschey, A. P. Green Fire Brick Co., speaker and Paul Anderson, International Harvester Co., chairman, malleable and gray iron session. Fig. 3: Leon Decker, Allis-Chalmers Mfg. Co., newly appointed chapter treasurer. Fig. 4: Paul Langley, Employers' Mutual Liability Insurance Co., Wausau, Wis., addressed the nonferrous group. Fig. 5: C. F. Haertel, Falk Corp., shown addressing the steel session. Fig. 6: W. E. Thew, Thew Pattern Works, Inc., Green Bay, Wis.; Frank Jacobs, Standard Brass Works, and H. W. Stoke, Thew Pattern Works Inc. Fig. 7: David Fahlberg, Grede Foundries, addressed the technical group. Fig. 8: C. L. Petty Jr., A. P. Green Fire Brick Co.; N. Amrhein, C. A. Stegemeyer and Stephen Pohl, Federal Malleable Co.; Joseph G. Kropka and H. Zellmer, Chain Belt Co., and Walter W. Roock, Badger Fire Brick & Supply Co. Fig. 9: E. T. Whilander, Hercules Powder Co., Chicago; Ted Mikolasewski, Maynard Electric Steel Castings Co., H. F. Headley and E. W. Warner, Grede Foundries. Photos by W. V. Napp, Badger Fire Brick & Supply Co.

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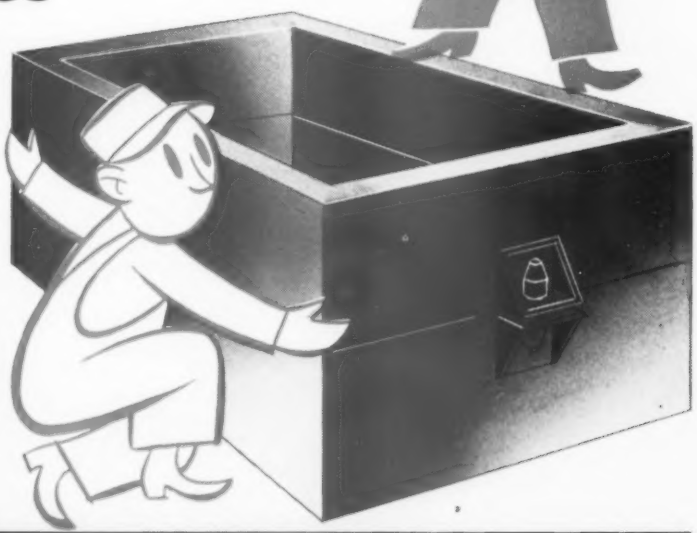

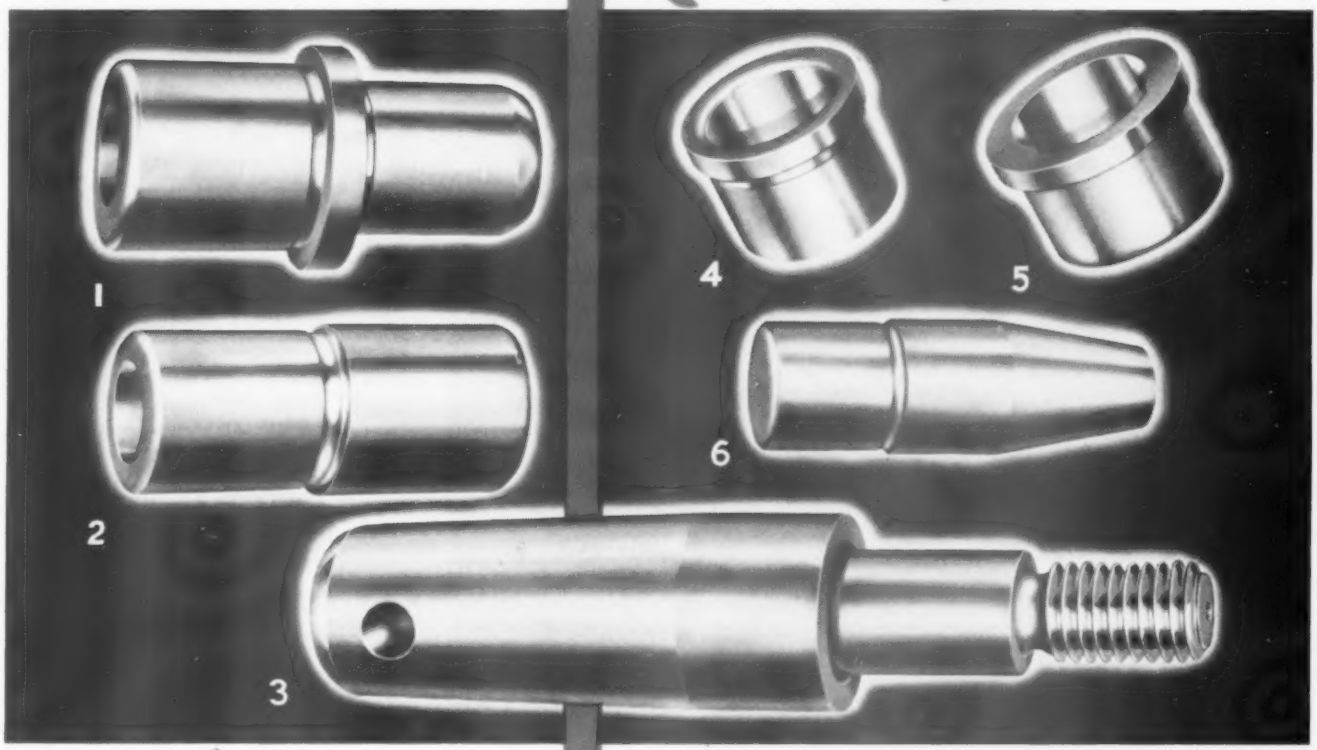

1. Shoulder Flask Pin
2. Plain Flask Pin
3. Plate Pin
4. Round Flask Bushing
5. Elongated Flask Bushing
6. Double Match Plate Pin

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(*Continued from page* 138)

Operations in a Malleable Foundry."

Mr. Joseph pointed out that high quality castings are the cheapest for a foundry to produce, and stated that shortages of pig iron as well as good scrap for melting have definitely increased foundry problems. In discussing melting facilities, he stated that not enough emphasis is placed on cupola lining repair, building and burning in of the bed, since uniform results from day to day cannot be expected if the inside dimensions of the cupola vary each day.

Hot blast and humidity control are of vital importance in controlling the metal melted. Variation in humidity during the day and also in different seasons of the year makes this control necessary to gain better carbon control. Mr. Joseph also stressed the importance of raw material control, stating that the place to start controlling chemistry of the iron is before it is charged into the cupola. Sand and annealing also were considered.

CENTRAL ILLINOIS: View of the Jan. 3 meeting of Central Illinois Chapter of the AFS at Jefferson Hotel, Peoria, Ill., is shown above. At left is C. A. Sanders, American Colloid Co., Chicago, who talked on "Foundry Sands." F. W. Shipley, Caterpillar Tractor Co., Peoria, is at right. Lower photo was taken at the Feb. 7 meeting. Left to right, are: Z. Madacey, Caterpillar Tractor Co.; Carl F. Joseph, Central Foundry Division, General Motors Corp., Saginaw, Mich., principal speaker, and Mr. Shipley, chapter chairman. Photos by courtesy of Caterpillar Tractor Co.

The showing of a movie on improvements in methods of work in the Central Foundry Division's shops by time and motion study concluded the meeting.—*V. W. Swango, Caterpillar Tractor Co.*

Northwestern Pennsylvania

OVER 100 members and guests attended the Feb. 28 meeting of the Northwestern Pennsylvania Chapter of the AFS, which was held at the Moose Club, Erie, Pa. Designated "Management Night," a good turnout from that branch of the industry was present. Principal speaker at the meeting was Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., who pointed out that since 1920 considerable progress had been made in gray cast iron and its production. In the early days it was difficult sometimes to meet a specification calling for 20,000 psi tensile strength while today with nodular graphite irons being developed, that property is around 100,000 psi.

In conjunction with the foundry equipment manufacturers the foundries have been able to make great strides in mechanization and modernization. Similarly the foundry supply firms have aided in making available such materials as chemical bond for molding sands, resin bonds for core sand, etc. However, even with the latest in equipment and supplies, they cannot be used to the best advantage unless the men are trained to get the most from them.

To that end, Mr. Kuniansky said, his firm established training schools to teach operators to perform work properly. Other aids include an incentive pay program, motion and time studies, job evaluation. His firm also has established a good neighbor policy with the communities in which plants are located, and this has proved beneficial. Management's job is to investigate all avenues which will ensure profitable operation and satisfied employees if they expect to continue in business.—*Edwin Bremer.*

Saginaw Valley

INDEPENDENT foundry and pattern shop night was observed at the Feb. 3 meeting of the Saginaw Valley Chapter of the AFS held at Fisher Hotel, Frankenmuth, Mich. There were 225 members and guests present. The independent foundries were presented by H. H. Wilder, Eaton Mfg. Co., Foundry Division, Vassar, Mich., and the pattern shops were presented by J. E. Winston, City Pattern & Engineering Co., Flint, Mich.

(*Continued on page* 143)

KIRK AND BLUM

Plenum chamber hood "cleans up" mold conveyor operation

American Foundry Company Replaces old Dust and Fume Removal System with modern KIRK & BLUM INSTALLATION

As a major step in foundry modernization and clean-up, the American Foundry Company of Indianapolis replaced their old, inefficient mold conveyor hood with a modern, efficient hood, designed and installed by KIRK & BLUM. The old system, as shown in the "before and after" photos, was severely worn; the air withdrawal rate was low, permitting dust and smoke to escape into the foundry.

The new KIRK & BLUM hood is designed so that the top is a plenum chamber, distributing air along the entire length of the hood. Every other panel is removable for access. Four exhaust units connect to the hood: each has a capacity of 13,000 CFM. Total air removed, 52,000 CFM, assures this firm cleanliness never before possible.

KIRK & BLUM systems, in many of the nation's leading foundries, practically eliminate dust and fumes from traditionally "dirty" jobs. Call the KIRK & BLUM Representative . . . more than 40 years of experience at your command, or ***write for your copy*** of "Dust Collecting Systems in Metal Industries," showing other typical installations. *The Kirk & Blum Mfg. Co., 2808 Spring Grove Ave., Cincinnati 25, O.*

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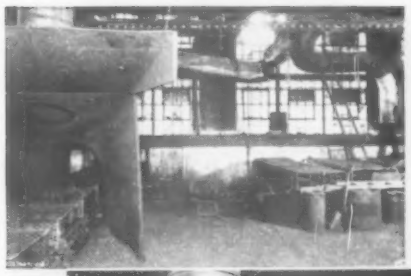
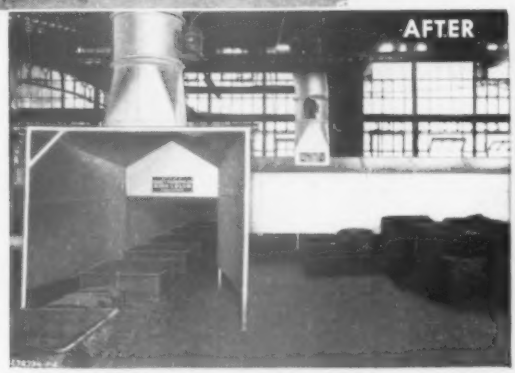
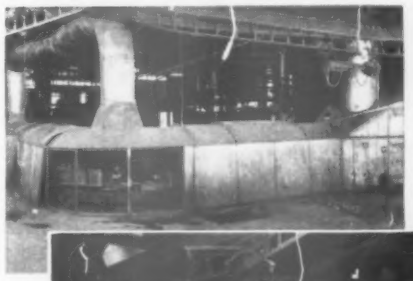
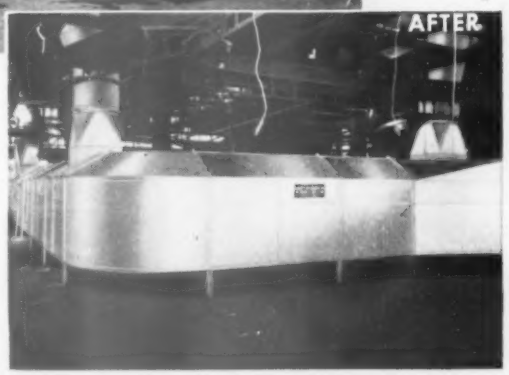
DUST AND FUME CONTROL SYSTEMS



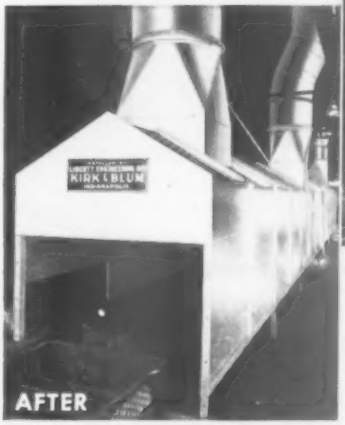


1. Entrance end of hood; note bolted section construction for ease of maintenance of conveyor.





2. Corner of conveyor. Note that new hood is off floor for ease of cleaning.



3. Exit end of conveyor and hood, showing the four duct-mounted exhausters with total capacity of 52,000 CFM.

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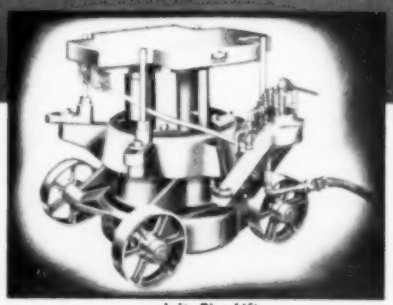
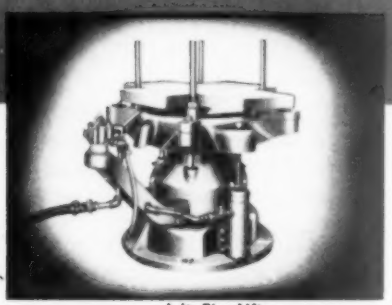
of your employees in the molding department is increased with Davenport molding machines.

Reduce Physical Labor
with Davenport molding machines. They make your employees more satisfied with their jobs.

Jolt Rollover Draw, Model A (6 sizes)

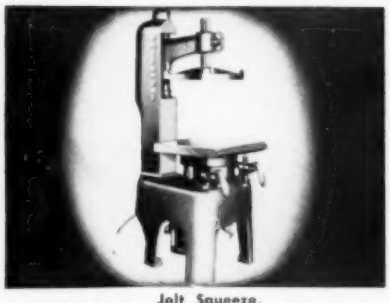


Jolt Pin Lift, Model AJS, Portable (5 sizes)

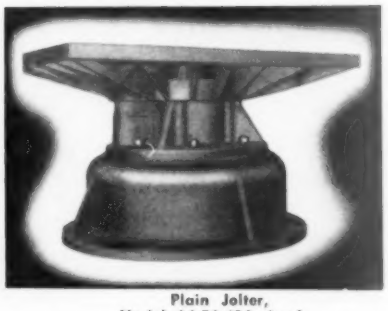


Jolt Pin Lift, Model AJS, Stationary (5 sizes)

Jolt Rollover Draw, Model SA (6 sizes)



Jolt Squeeze, Model 10-JX, Portable and Stationary



Plain Jolter, Model AJ-RJ (34 sizes)

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DAVENPORT MACHINE AND *Foundry Company*

DAVENPORT IOWA U. S. A.

Representatives: Canada — Canadian Foundry Supplies & Equipment Ltd., Toronto and Montreal • France, Belgium, Luxemburg, Switzerland—Ph. Bonvillain & E. Ronceray, Choisy-Le-Roi, Rue Paul Carle, Seine, France. All other foreign countries — R. K. Price Associates, Inc., 70 Pine Street, New York 5, New York, U. S. A.

(*Continued from page* 140)

"Modern Pattern Equipment" was discussed by Edgar Maier, plant superintendent, Saginaw Pattern & Mfg. Co., Saginaw, Mich. Mr. Maier pointed out that the patternmaker, as a servant to the foundryman, must be equipped with analytical ability combining skills of a metallurgist, coremaker, rigger, gating expert and cleaning room supervisor. Materials for patterns must be selected with the idea in mind as to the number of castings to be made, tolerance to be maintained on size and ultimate end use. Only the best pattern materials should be used for patterns of mass production items.—*Kenneth H. Priestley, Vassar Electroloy Products Inc.*

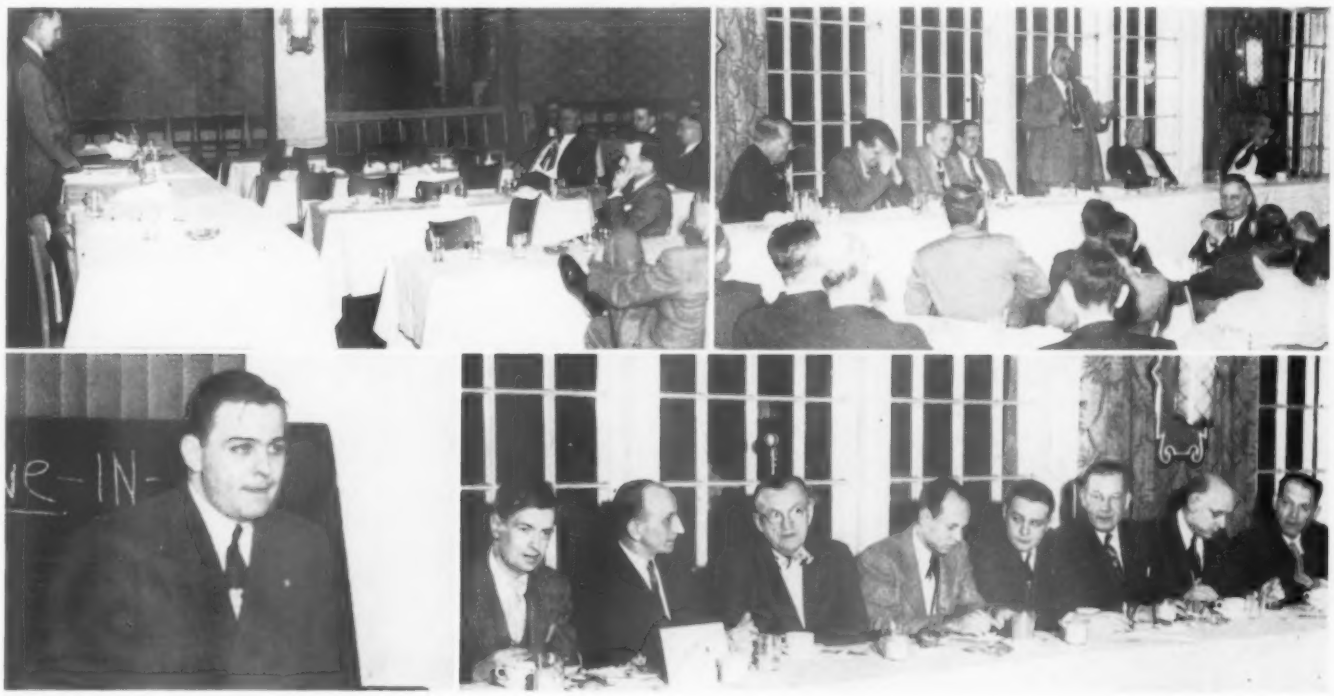
Central Ohio

TWO technical speakers featured the Feb. 14 meeting of the Central Ohio Chapter of the AFS held at Chittenden Hotel, Columbus, O. In addition, Chief W. G. Strickfaden of the Columbus fire department presented a coffee talk on the growth of the city's fire department and related some interesting stories of the early days of Columbus fire fighting.

Dr. C. H. Lorig of Battelle Memorial Institute, Columbus, addressed the chapter's steel group on "Heat Treatment of Steel Castings." He re-

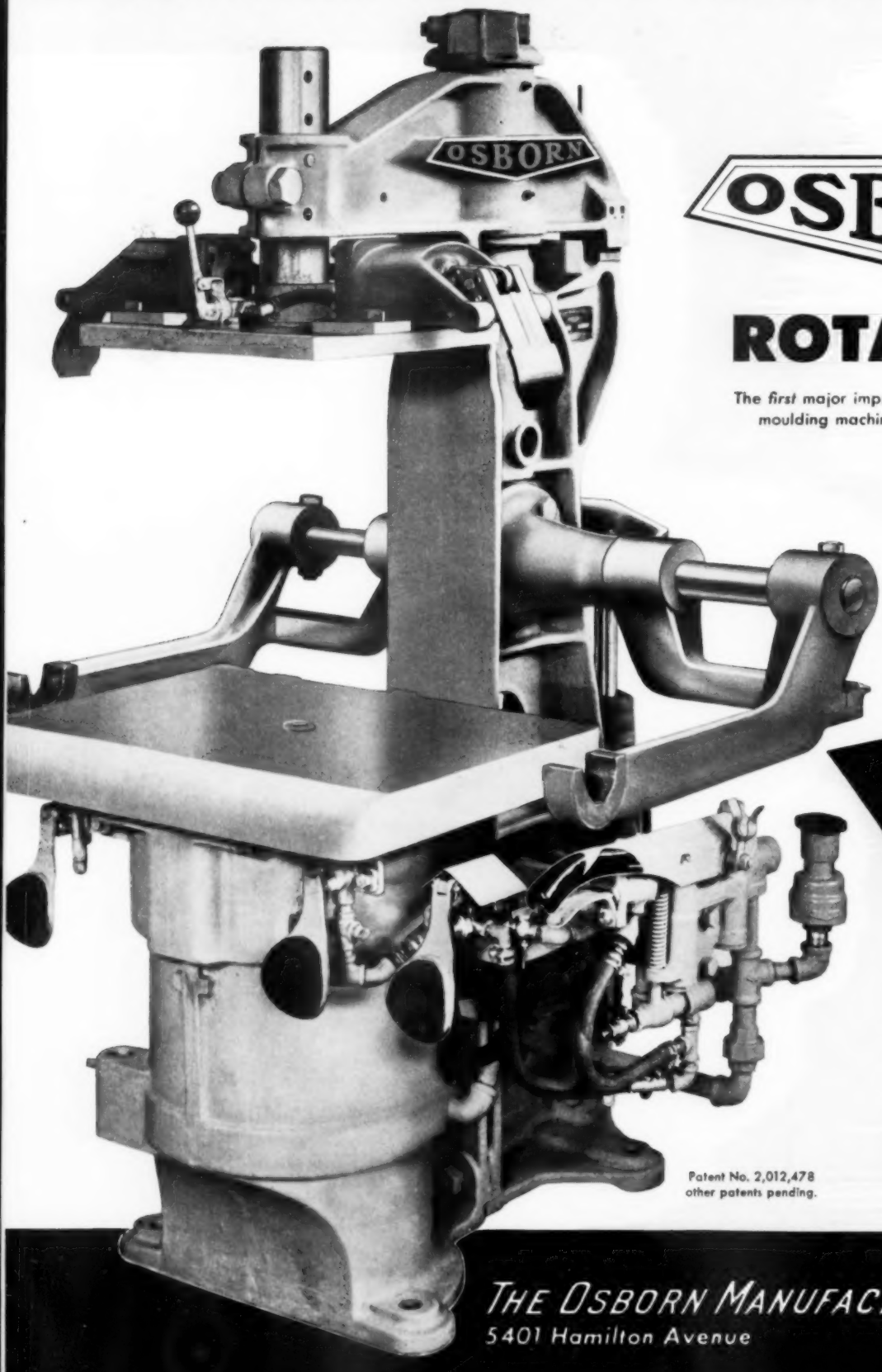
(*Continued on page* 146)

SAGINAW VALLEY Chapter of the AFS celebrated independent foundry and pattern shop night Feb. 3 at Fisher Hotel, Frankenmuth, Mich. View of the speakers' table at top includes, left to right: J. E. Winston, City Pattern & Engineering Co., Flint, Mich.; Edgar Maier, Saginaw Pattern & Mfg. Co., Saginaw, Mich., principal speaker; E. C. Hoenicke, Eaton Mfg. Co., Foundry Division, Detroit, and E. F. Booth, Saginaw Pattern & Mfg. Co. Lower view shows part of the group of 225 guests who attended the meeting



CENTRAL OHIO: View at upper left shows E. C. Hoenicke, general manager of the Foundry Division, Eaton Mfg. Co., Detroit, addressing the January meeting of Central Ohio Chapter of the AFS. Upper right shows the speakers' table at that meeting. At lower left N. J. Henke, Central Foundry Division, General Motors Corp., Saginaw, Mich., is shown addressing the February meeting. The speakers' table at that meeting is shown at lower right

THIS NEW OSBORN ROTA-LIFT ELIMINATES LIFT OPERATIONS



OSBORN

ROTA-LIFT

The *first* major improvement in match-plate moulding machines in over 30 years!

ROTA-LIFT
jolts
rolls
squeezes
draws
closes

Patent No. 2,012,478
other patents pending.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland, Ohio

MOULDING MACHINE ...SAVES LABOR!

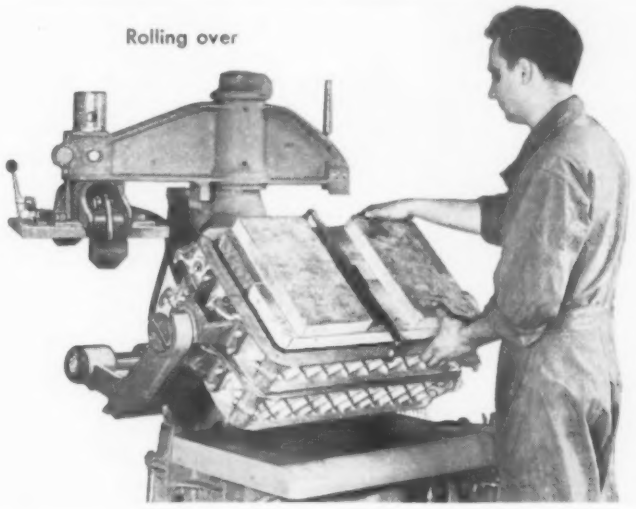
HERE'S YOUR ANSWER TO LARGE MATCH-PLATE MOULDING

THIS is *Rota-Lift* ... Osborn's *new mechanized* Match-Plate Moulding Machine! Rota-Lift and *only* Rota-Lift will perform the following operations mechanically—*rollover*, *draw* and *close*—in *addition* to conventional jolting and squeezing. These exclusive Rota-Lift features will conserve the physical energies of moulders and make your foundry a better place in which to work.

With the fatigue factor reduced to a minimum, production is increased and operation costs reduced accordingly. And for the first time, machine moulding using large match-plate patterns is practical on short runs, or you can increase the number of castings per mould on your present squeezer work.

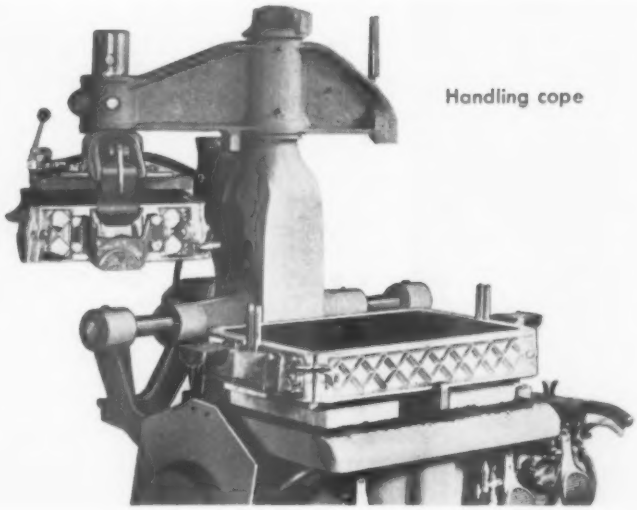
Contact us today for complete details on *Rota-Lift*—the first major improvement in match-plate moulding machines in 30 years!

Rolling over

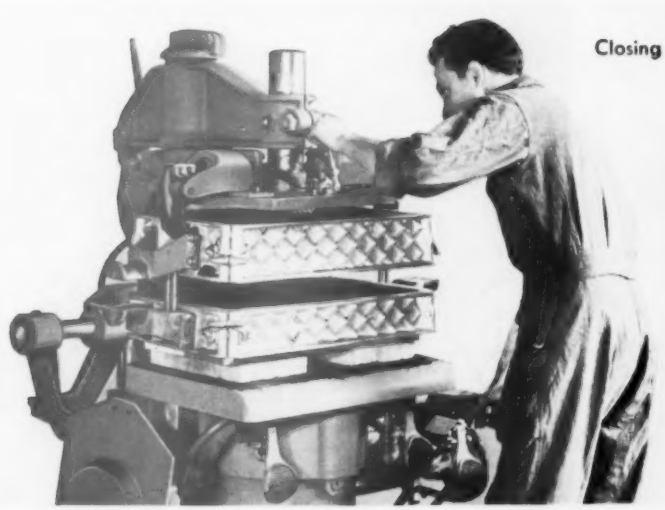


Drawing cope

Handling cope



Closing



MEMBER

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

OSBORN

MOULDING MACHINES CORE BLOWING MACHINES

(*Continued from page* 143)

viewed briefly the more common methods of heat treating steel castings and then described the application of Jominy hardenability and the use of continuous cooling data for assessing different types of steel castings. The principal purposes of heat treatment were given as: To recrystallize the steel to refine the coarse, as-cast structure; and to homogenize the steel, correcting segregation which occurs during freezing.

The importance of the structure of cast steel and the dependence of mechanical properties upon structure were illustrated by a number of slides. It was pointed out that the structure obtained at different rates of cooling from a temperature above the critical temperature is dependent on base composition and alloy content, which in turn determine to a large extent the hardenability of the steel. Only a few of the elements in steel, such as carbon and hydrogen, diffuse with ease.

Other elements, such as manganese, nickel and phosphorus, which are especially prone to segregate, diffuse slowly in steel and only at high homogenizing temperatures. Because there is practically no fundamental information regarding the transformation of austenite in cast steels for different rates of continuous cooling from heat-treating temperatures, the heat treater in foundries is obliged to rely mainly upon his judgment as to the heat-treating schedule he shall use to obtain a desired result.

The malleable iron group had as its speaker N. J. Henke, Central Foundry Division, General Motors Corp., Saginaw, Mich., who discussed foundry educational programs. Mr. Henke emphasized the need of training programs and educational activities both within and without the foundry industry. He pointed out that of the 50,000 engineering graduates from 125 schools in 1948, only 7000 had any contact with the foundry, and of these, less than 100, or less than 0.2 per cent, went into the foundry industry.

He suggested that technical training could well be started at the top supervisory level in many plants and carried down through the organization. Such training programs should be set up with a definite and concrete program based upon practical requirements of the organization, and should be so established that they do not break down into a series of unrelated bull sessions.

Important technical developments of the past 30 years were reviewed and the following developments were outlined by Mr. Henke as being the most likely useful developments for the future: Use of oxygen as an aid in melting; ultrasonic processes for dust control; treatment of coke to reduce ash content; better methods of chemical analysis; manufacture of duplicate patterns; elimination of seacoal; high-frequency heat treatment; ultrasonic inspection of castings; automatic molding, dielectric core baking, precision casting; and an effective program to make the foundry a better place to work.—*H. W. Lownie Jr., Battelle Memorial Institute.*

TWIN CITY Chapter of the AFS met at the Covered Wagon, Minneapolis, Jan. 6, to hear Charles B. Schureman, National Lead Co., Chicago, speak

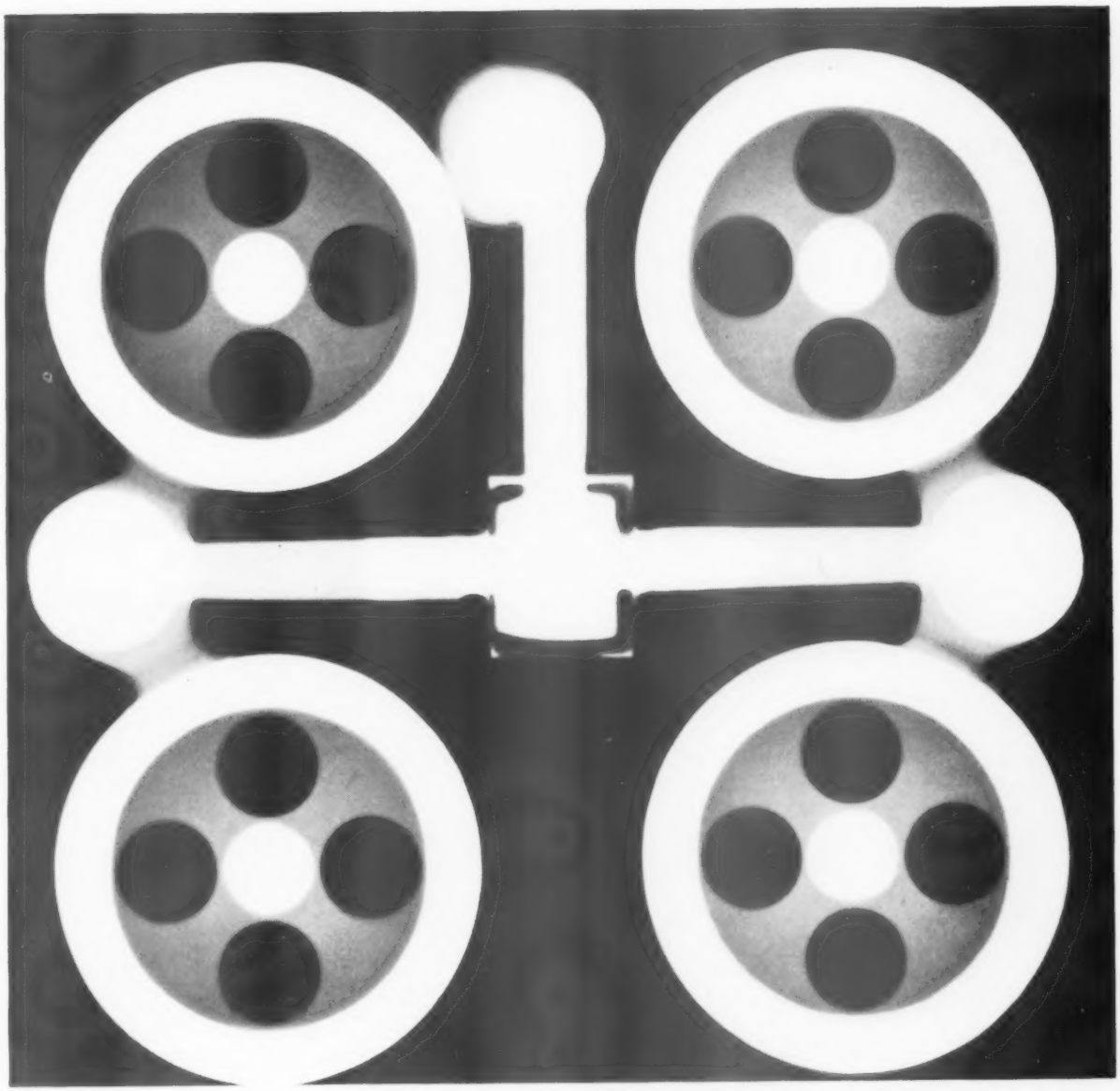
Twin City

MORE than 100 members and guests were present at the Feb. 3 meeting of the Twin City Chapter of the AFS to hear W. B. McFerrin, Electro Metallurgical Co., Detroit, speak on "Control of Casting Defects."

According to the speaker, the degree to which foundries solve their control of casting defects is in direct proportion to their success in the foundry business. The founding of more than 15 million tons of ferrous metals last year was used as a striking example of the monetary savings which could be consummated if scrap were controlled. If there had been 1 per cent less scrap last year, there would be available today 150,000 tons of good castings for industrial use, and pricewise this would mean roughly a saving of $30,000,000.

In setting forth the procedure for the analysis of casting defects, Mr. McFerrin stated bluntly that man-

(*Continued on page* 148)



This shows you what money looks like

• The profit dollar looks bigger after an x-ray picture.

This is true in the steel business and it is true in automobiles, machine tools, shoes, confectionery and other businesses too.

A large Midwest foundry turned out a gear casting that could and did pass visual inspection. But machining disclosed shrinkage in tooth flanges too often to satisfy management.

General Electric Industrial X-Ray equipment, purchased by the company as an inspection and developmental tool, gave the answers. (1) Change three small runners between riser and casting into a single, larger runner. (2) Heighten the riser; make it cylindrical.

Trouble disappeared.

This is no isolated incident. General Electric Industrial X-Ray units point the way to lower production costs, reduced overhead, fewer rejects for the $20,000 company and the $20,000,000 company. A unit often pays for itself on the first job. For details, write to General Electric X-Ray Corporation, Dept. D-37, Milwaukee, Wisc.

GENERAL ELECTRIC
X-RAY CORPORATION

Pangborn Stops Dust

where Universal Electrical Products are made . . .

At Landers, Frary and Clark, New Britain, Conn., profits depend on efficient production of their famous *Universal* Electrical Products. And . . . their efficient production depends in part on Pangborn Dust Control, for damaging dusts produced by milling machines such as the one shown at left could play havoc in the plant if they weren't collected at the source.

To guard products and machinery, and to insure good industrial housekeeping, this manufacturer of *Universal* toasters, waffle irons, mixers, heaters, irons and fans turns to Pangborn Dust Control to stop the Dust Hog.

Dust is collected at the source through exhaust hoods installed on the milling machines. Then it's conveyed through ducts to a Pangborn "CH" Collector outside the building where it is stored for convenient disposal.

If you have a dust problem, let Pangborn help you solve it. No matter whether you want to improve plant working conditions or efficiency, increase product quality, reduce machine maintenance or recover valuable dust by-products, a Pangborn Dust Control System, tailored to the job by Pangborn engineers, is the positive way to solve it.

Let us make a dust pocket survey in your plant. There's no obligation or cost to you, but it will enable us to recommend the right Pangborn Equipment to help your production. Write for information and get your free copy of "The Control of Industrial Dust." PANGBORN CORPORATION, 300 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for all the latest developments in Dust Control and Blast Cleaning Equipment.

STOP THE DUST HOG
from stealing profits with

Pangborn

DUST CONTROL

(*Continued from page* 146)

agement is too prone to blame the worker for casting defects. He recommended intensive study by management of the AFS *Casting Defects Handbook* and pointed out how pouring metal can potentially cause 24 foundry defects while metal composition causes only 13. Mr. McFerrin illustrated his discussion with an excellent series of slides.—*O. J. Myers, The Werner G. Smith Co.*

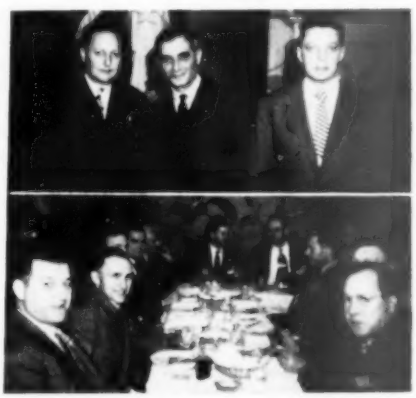
Michiana

WITH an attendance of 114 members, the Michiana Chapter of the AFS at its meeting in Hotel LaSalle, South Bend, Ind., on Feb. 1, featured Dr. H. L. Campbell of the Precision Scientific Co., Chicago, who spoke on "Cores and Core Materials."

Having spent some thirty years in research work in this field, Dr. Campbell gave the following seven basic rules for good core practice: Select core sands on the basis of grain distribution; select core binders on the basis of properties required; establish standard economical mixtures based on actual properties; determine best procedure for mixing based on results obtained; adjust baking conditions to obtain most favorable properties; check properties of standard core sand mixtures regularly; arrange to have all dry sand cores placed in green sand molds for the shortest time before pouring.

In the evaluation of properties of core mixtures, Dr. Campbell pre-

(*Continued on page* 150)



NORTHWESTERN PENNSYLVANIA Chapter of the AFS met at the Moose Club, Erie, Pa., Jan. 24. At top, left to right, are: Joseph S. Hornstein, Meadville Malleable Iron Co., Meadville, Pa., and chapter chairman; N. Ransohoff, N. Ransohoff Inc., Cincinnati, principal speaker, and Joseph A. Shuffstall, National-Erie Corp., Erie, chapter vice chairman. Bottom view shows part of the group attending the meeting

Only the Robins Floatex Shakeout can perform these two foundry operations without removing the casting!

No wonder this Robins Floatex Shakeout is saving time . . . money . . . headaches.

First, it shakes out the 5800-lb. flask, containing a 2600-lb. casting with a 1200-lb. core. Time: 3 minutes. *Then, while the casting remains on the deck*, it knocks out the core! Knockout time: 2 minutes.

No longer need the casting be taken to another point on the foundry floor, where men remove the core with sledges or mechanical hammers! The entire job is done as *one* operation with *one* machine.

Only the Robins Floatex Shakeout is powerful enough to knock out heavy cores as well as to shake out flasks—without damaging either! And only the Robins Floatex Shakeout is genuinely full-floating; it shakes the flask, not the foundry!

What is more, *only* the Floatex has a stroke adjustable to each shakeout or knockout requirement . . . from a unit as big as the hull of a General Sherman tank to one as small as a household valve.

Whether you want to do shakeout and knockout as a single operation or shakeout at night and knockout in daytime (when machine would otherwise be idle), write Robins.

Learn how both jobs can be done with *one* machine . . . by making only *one* investment.

ROBINS

FLOATEX SHAKEOUT

WRITE TODAY. Learn how you can save time, money and headaches by installing a Robins Floatex Shakeout. Made in portable and stationary types—with or without automatic, mechanical self-discharge feature. Address Robins Conveyors Division, 270 Passaic Avenue, Passaic, N. J.

ROBINS CONVEYORS DIVISION HEWITT-ROBINS INCORPORATED

TRI-STATE Chapter of the AFS heard a discussion on "Core Blowers" by Otto Ostermann, Redford Iron & Machine Co., Detroit, Jan. 21. A coreblowing machine was set up in the meeting hall to demonstrate points in Mr. Ostermann's talk. Photo courtesy of F. E. Fogg, Acme Foundry & Machine Co.

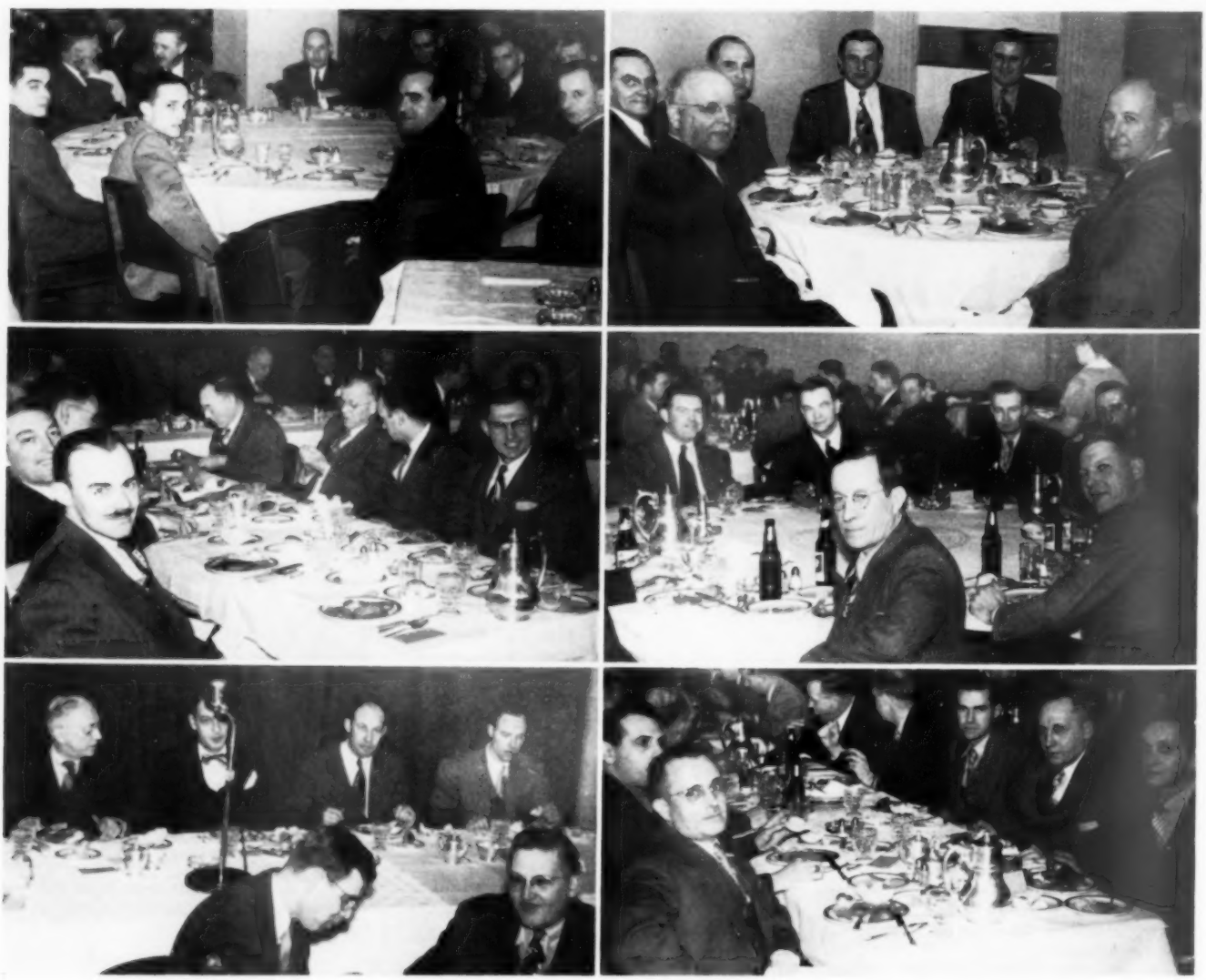
(*Continued from page* 148)

sented various mixtures, showing requirements of binders, baking temperatures, green strength, dry strength, gases evolved and temperature ranges within which sand binders are effective.

Ninety-eight members of the Michiana Chapter were present Mar. 1 at the Rumely Hotel in LaPorte, Ind., to hear an address by Frank G. Steinebach, editor of THE FOUNDRY. Mr. Steinebach substituted for William G. Gude, the publication's managing editor, who was unable to appear because of illness.

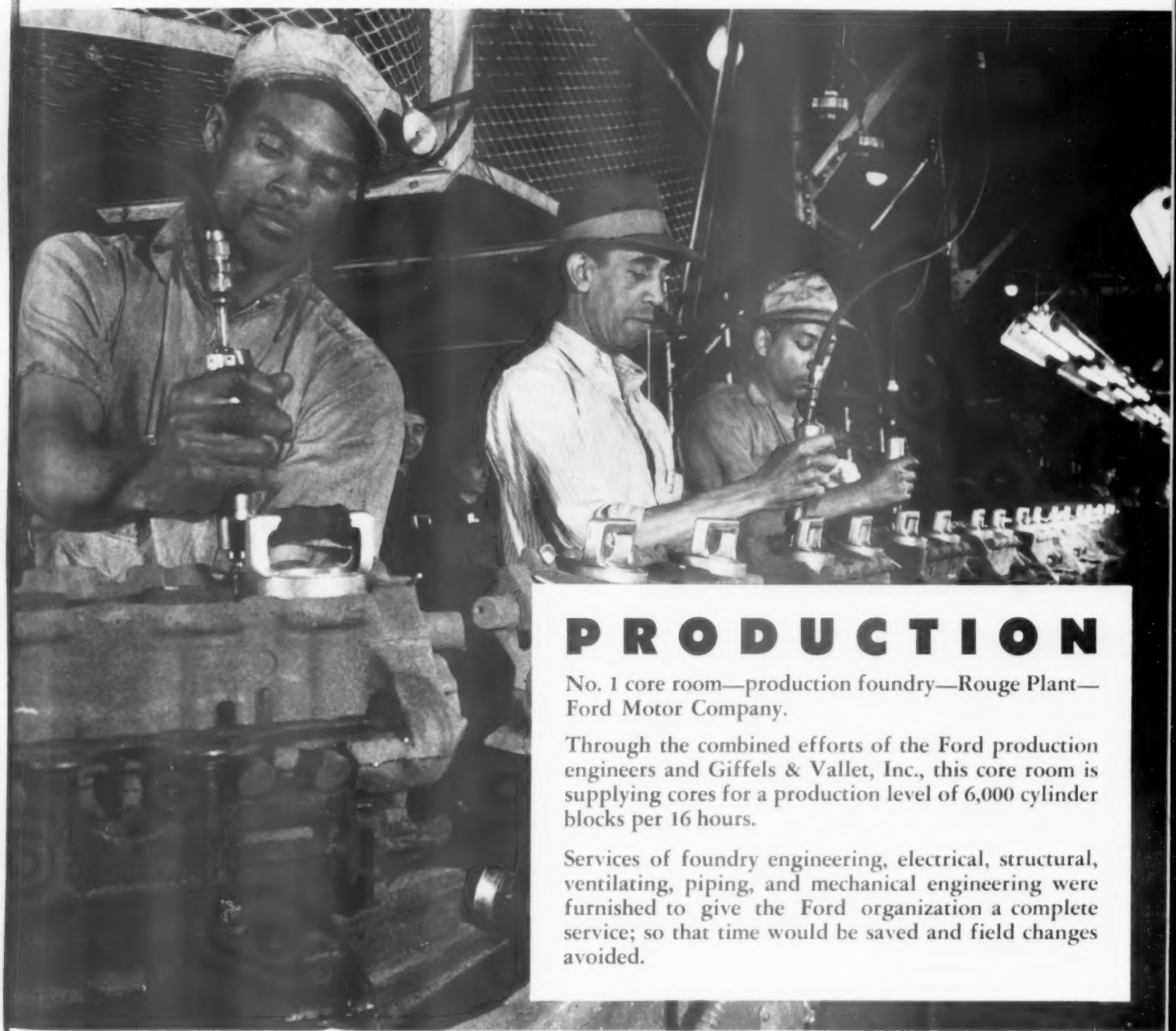
The subject of his talk was "What's Ahead in the Foundry Industry." In his opinion, the foundry industry must stabilize itself at a lower price level through wider distribution and greater use of technical development, mechanization, waste elimination and better co-operation between labor and management. William Ferrell, general su-

(*Continued on page* 152)



CHICAGO: Views of the Jan. 3 meeting of Chicago Chapter of the AFS. Photos courtesy of George J. Biddle, Illinois Clay Products Co., Chicago

Jacket cores being assembled on buggy conveyor. Component cores (Barrel, Shallow Jacket, Ports, and Deep Jacket) fitted and ground are delivered on monorail con veyors within easy reach of the mechanics. Cores are pasted and assembled on fixtures. Men in foreground are tightening clamping bolts which hold cores togethe



PRODUCTION

No. 1 core room—production foundry—Rouge Plant—Ford Motor Company.

Through the combined efforts of the Ford production engineers and Giffels & Vallet, Inc., this core room is supplying cores for a production level of 6,000 cylinder blocks per 16 hours.

Services of foundry engineering, electrical, structural, ventilating, piping, and mechanical engineering were furnished to give the Ford organization a complete service; so that time would be saved and field changes avoided.

GIFFELS & VALLET, INC.

INDUSTRIAL ENGINEERING DIVISION

1000 MARQUETTE BUILDING, DETROIT

CINCINNATI DISTRICT Chapter of the AFS honored sustaining and student members Feb. 14 at the Engineering Society, Cincinnati. Student members attending the meeting are shown in upper view. They are, left to right: R. Stevens, George M. D'Angelo, E. A. Knavf and L. Yeardly. Lower photo shows representatives of sustaining members. Left to right are: Robert Cory, Hamilton Brass & Aluminum Co., Hamilton, O.; Peter Rentschler, Hamilton Foundry & Machine Co., Hamilton; A. L. Grim, Dayton Malleable Iron Co., Dayton, O.; J. M. Kane, American Air Filter Co., Louisville; A. Oberhelman, Oberhelman-Ritter Foundry Co., Cincinnati; J. Herkenhoff, Minster Machine Co., Minster, O., and W. J. Buvinger, Buckeye Foundry Co., Cincinnati

(*Continued from page* 150)

perintendent of Auto Specialties Mfg. Co., St. Joseph, Mich., introduced the speaker and A. K. Nelson, Chicago Hardware Foundry Co., Elkhart, Ind., chapter chairman, presided.—*S. F. Krzeszewski, American Wheelabrator & Equipment Corp.*

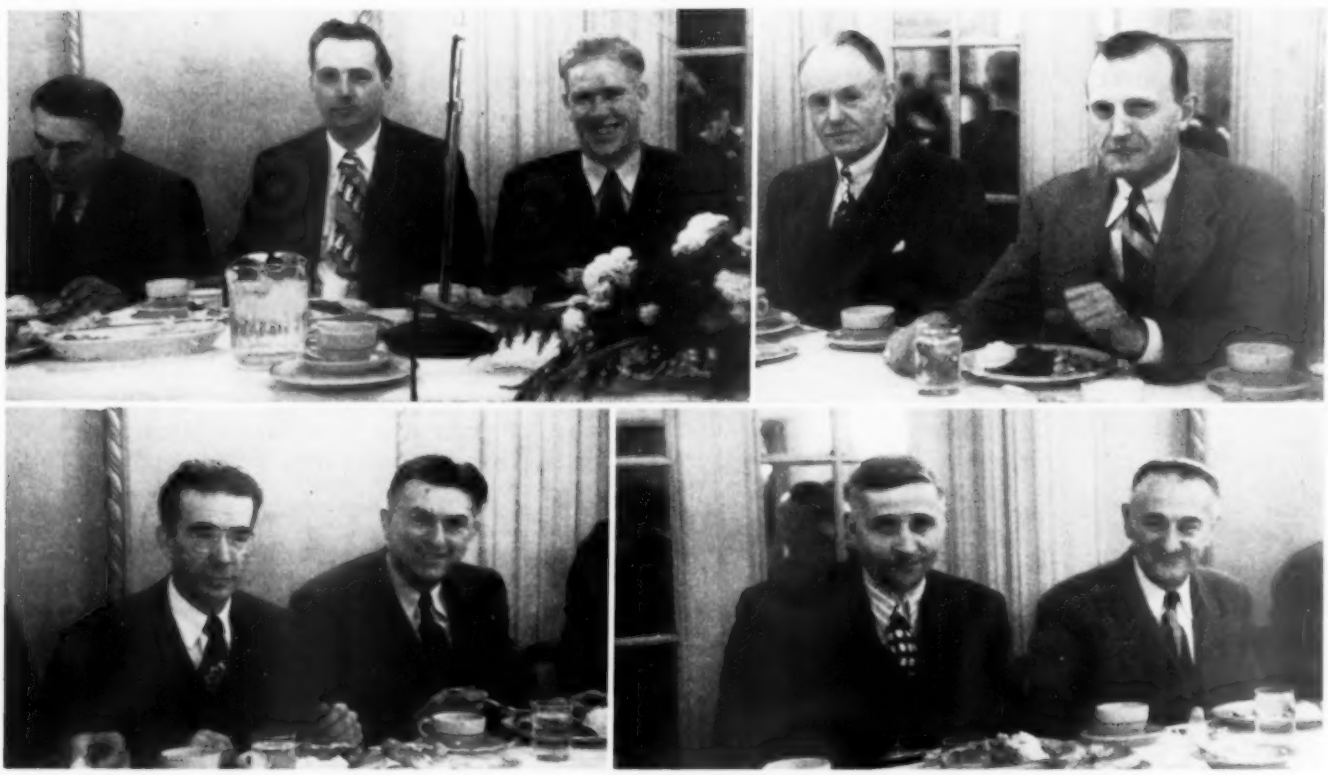
Cincinnati

SUSTAINING and student members of Cincinnati District Chapter of the AFS were honored at the Feb. 14 meeting held in the Engineering Society, Cincinnati. B. D. Claffey, executive vice president, Acme Aluminum Alloys Inc., Dayton, O., addressed the 80 members and guests present on the subject of foundry education.

He stressed the fact that the foundry, in offering the greatest challenge of any industry, definitely needs intellectual young people to make foundry work a career. To attract these young people, the first step is to show the educators what opportunities exist in a foundry in order that they might give vocational guidance to students.

Conducted tours through foundries

(*Continued on page* 154)



NORTHEASTERN OHIO Chapter of the AFS met at Tudor Arms Hotel, Cleveland, Jan. 13. Some of those at the speakers' table are shown above. Top row, left to right, are: Ed Glossner, Modern Pattern Works; Richard R. Senz, Aluminum Co. of America; Walter Sicha, Aluminum Co. of America and chapter chairman; Earl Turner, and William G. Gude, *The Foundry*. Bottom row, left to right; Charles Wilberschied, Master Pattern Co.; Mr. Glossner; Tom West, West Steel Castings Co., and Frank C. Cech, Cleveland Trade School, all of Cleveland. Photos by Sterling Farmer, Sand Products Corp.

It stops profit leaks in the cleaning room

LIKE A CHAIN that is no stronger than its weakest link, a foundry can not attain peak efficiency—and earning power—with jumbled piles of castings strewed around the cleaning room.

In most foundries the time and the cost of handling castings from the shakeout through the cleaning room can be—and should be reduced.

Apron Conveyors of proper design, and properly used, permit cleaning room and inspection operations to be synchronized with the tonnage passing over shakeouts—eliminate re-handling—and produce an orderly "flow" of castings similar to the controlled flow of sand through a sand conditioning plant—or to the control of molding, pouring, cooling and shaking out made possible with a run-around mold conveyor.

Slow speed Apron Conveyors, with or without hoods, provide one of the few generally approved methods of cooling castings from shakeout temperatures of around 1500°F., to the temperatures required for mill cleaning or hand sorting.

Apron Conveyors with heavy duty flat tops and no sides, that permit the easy loading and unloading of castings, make ideal chipping conveyors.

Let the Bartlett-Snow engineers, with their wide familiarity with the needs of practical day to day foundry operation, work with you in making your cleaning room as efficient and smooth running as other parts of your foundry. The C. O. Bartlett & Snow Company, Cleveland 5, Ohio. Engineering representatives in New York, Baltimore, Detroit, Chicago.

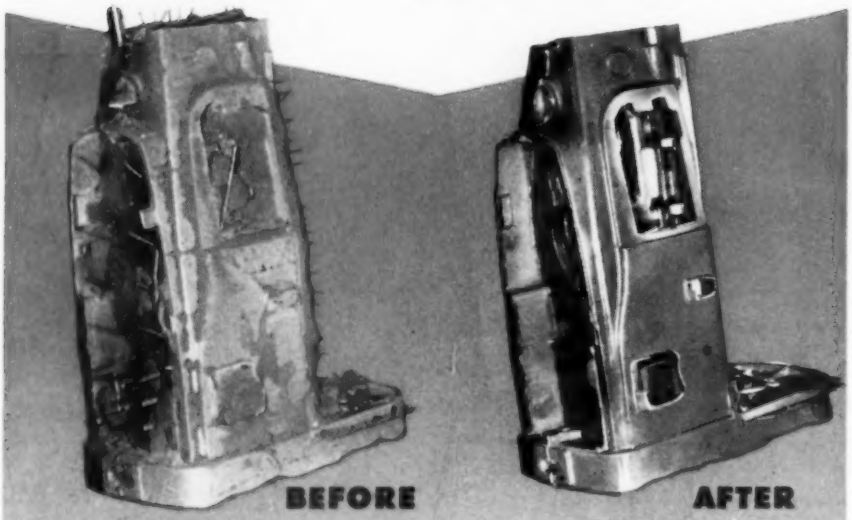
BARTLETT-SNOW
CLEVELAND 5, OHIO

DESIGNING AND CONTRACTING ENGINEERS

For the Foundry Industry

SAND, MOLD AND CASTINGS HANDLING EQUIPMENT

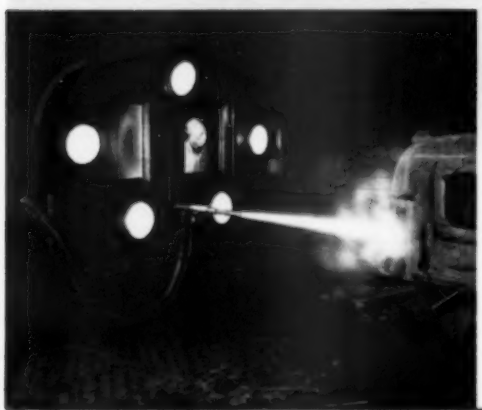
Pangborn Hydro-Sand Blast can do jobs like this for You . . . in 15 minutes!



THESE photos were taken of the same casting 15 minutes apart . . . before and after it underwent core knockout and blast cleaning *in one operation* in a Pangborn Hydro-Sand Blast Room.

This modern installation propels a high-velocity stream of sand and water that blasts, cuts and cleans. Work rotates on a controllable table inside the steel room while the operator manipulates the blast stream from outside. There's no dirt or dust. It's a cleaning room that *keeps itself clean* . . . reducing dust in other working areas.

With this Pangborn Hydro-Sand Blast Room, you recover core sand and reclaim core rods *without* sledge damage. Your subsequent roughing and chipping operations become faster, cheaper jobs because of the thoroughness and efficiency of this remarkable machine. It's custom-built to meet your requirements.



Write for this information-packed, fully-illustrated bulletin (No.1100) on the Hydro-Sand Blast Room. PANGBORN CORPORATION, 2300 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for all the latest developments in Blast Cleaning and Dust Control Equipment.

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

(*Continued from page* 152)

by educators and students will create interest and desire of many young men to want a foundry career. However, it is necessary to have good clean-up facilities and good working conditions to back up the claim that a foundry is a good place to work.

Mr. Claffey stated that approximately 80 per cent of the young men do not go on to college, and those attending trade schools have all manual arts with the exception of foundry, which is a serious loss to the industry. Technical men speaking before school groups after interest has been aroused, can effect the instituting of such courses in trade schools.

Next meeting of the chapter will be held at the Anthony Wayne Hotel in Hamilton, O., on April 11. Frank G. Steinebach, editor of THE FOUNDRY, will speak on, "What's Ahead in the Foundry Industry?"—*B. A. Genthe, S. Obermayer Co.*

Chicago

CONTINUING its notable successes with roundtable group meetings, the Chicago Chapter of the AFS featured four group discussions and an interesting coffee talk at its Feb. 7 meeting. Approximately 200 members and guests attended the meeting held at the Chicago Bar Association.

W. D. McMillan, metallurgist, McCormick works of the International Harvester Co., Chicago, and vice president of the chapter, introduced Ray A. Witschey, ceramic engineer of the A. P. Green Fire Brick Co., Chicago. His subject, "Glimpses of Europe Today," was based upon impressions gained during a recent business trip to Norway, Sweden, Denmark, Holland, Switzerland, France and England.

(*Continued on page* 156)

EASTERN NEW YORK Chapter of the AFS held its regular monthly meeting Feb. 15 at Circle Inn, Lathams, N. Y. Shown above is a group of nonferrous foundrymen in informal discussion at the meeting. Principal speaker (second from right) at the meeting was B. A. Miller, chief metallurgist and superintendent of the foundry, Baldwin Locomotive Works, Philadelphia. Photo by L. M. Townley, Adirondack Foundries & Steel Inc.

"SKIP-N'-VEYOR"

PORTABLE SHAKE-OUT CUTS SHAKE-OUT COSTS OF MIDWESTERN FOUNDRY SQUEEZER FLOOR.

Travelling under its own power on a track across the end of the roller conveyors on the squeezer floor, the "Skip-N'-Veyor" with a crew of 2 accomplishes the work formerly done by a crew of 12 men.

Moulds are dumped (as illustrated in the above photo) into a skip which elevates them to the Gyroset Shake-Out for separation of castings from the sand, cores, etc. Castings are discharged into a box on a dolly car at one end. The sand passing thru the shake-out is conveyed to the opposite end and elevated to discharge into a large hopper on a dolly car which is conveyed to sand recovery system.

"Skip-N'-Veyor" is equipped with the Gyroset (two bearing eccentric) shake-out.

BUILT BY THE MAKERS OF GYROSET AND SELECTRO VIBRATING SCREENS, AND GYROSET SHAKE-OUTS FOR ALL STANDARD AND SPECIAL APPLICATIONS.

PRODUCTIVE EQUIPMENT CORP.

★

Write for additional information on the GYROSET "SKIP-N'-VEYOR" Portable Shakeout.

2926 W. LAKE STREET, CHICAGO 12, ILL.

THIS ONE IS ON THE HOUSE

We believe the best way to test the claims of any advertiser is to test the products yourself. So if you will please fill out the attached form, we will be glad to send you samples of the products you care to check.

CHECK HERE ➡ * "SUPERFLAKE" FOUNDRY PRODUCTS

	* "MOLDUKO" CORE & MOLD WASH Produces smooth castings—Stops "burning in"—Airdries Will ship **10 Gals. of Molduko & 25 lbs. of Filler** at full drum prices for test purposes.
	HYDRO GRAPHITE ***(It's New!)*** Excellent permanent mold wash.
	* "CARBON-RAISER" (Add to the metal in the ladle, at the spout, in the furnace or in the cold charge) **IRON FOUNDRIES** use to control depth of chill and improve the machineability of the castings. **STEEL FOUNDRIES** use to control carbon content, in the ladle and in the furnace quickly, accurately and efficiently.
	PARTING Non Silica or Tripoli, Highest Quality
	PIPE REDUCER Used on "Gates" and "Risers" in Steel & Iron foundries.
	PLUMBAGO & CORE WASHES In both Dry and Paste forms.
	LADLE WASH
	MUDDING COMPOUNDS
	CORE PASTES Strong bond, Dry quickly.

* Trade Marks Reg. U. S. Pat. Off.

Please send me samples and further information on the products checked above.

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SUPERFLAKE GRAPHITE PRODUCTS

SUPERIOR FLAKE GRAPHITE COMPANY

Manufacturers of mold and core washes, facings, parting compounds, core paste, carbon-raiser.

TELEPHONE: RANDOLPH 7939

33 So. Clark Street *Chicago (3) Ill.*

(*Continued from page* 154)

The roundtable of the Nonferrous division heard E. I. Shumm Sr., president, The Coremakers Inc., Chicago, discuss "What Constitutes a Good Core?" Martin G. Dietl, nonferrous metallurgist, Crane Co., Chicago, was discussion leader. The speaker covered all the usual factors considered necessary in the production of satisfactory cores.

Malleable and Pattern divisions joined hands in a roundtable on "What Does a Foundryman Expect of a Pattern?" W. A. Balton, assistant foundry superintendent, Link-Belt Co., Chicago, was the speaker, and H. K. Swanson, owner, Swanson Pattern & Model Works, East Chicago, Ind., was discussion leader.

Gray Iron division devoted its attention to cupola linings. James Wilkins, foundry superintendent, Thor Corp., Chicago, was chairman and Mr. Witschey, who presented the coffee talk, was the speaker. Mr. Witschey asserted that the type of coke available today does not give good distribution in the the cupola, with the result that air blows around the circumference to cause lining damage.

Lining maintenance varies from relining each day in the case of large shops operating cupolas for malleable duplexing, to patching as practiced by small shops. Each shop will profit by following some established policy concerniing maintenance. Cupola lining starts with the blocks, which should be installed with high-temperature mortar. Careful installation of the blocks and careful maintenance will pay dividends.

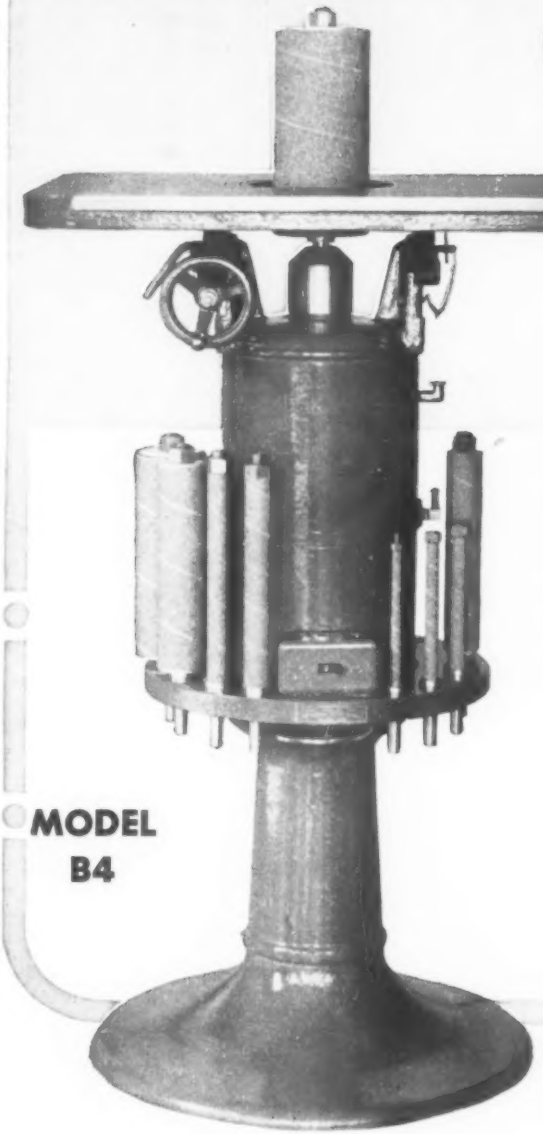
Mr. Witschey pointed out that there still is a question as to which is superior, the brick lining or the

(*Continued on page* 158)

Non-Ferrous Founders Plan St. Louis Meeting

St. Louis Chapter of the Non-Ferrous Founders' Society will be host at a dinner to be held May 2 at the York Hotel. The occasion, "Old Timers' Night," will honor past presidents and directors of the society, and all members of the organization who are attending the American Foundrymen's Society convention in St. Louis are invited to attend. A J. Messmer, president, Messmer Brass Co., St. Louis, and chairman of the local chapter, promises a gala evening.

USE **FREEMAN EQUIPMENT**
IN YOUR PATTERN SHOP
FEWER DELAYS
AND MORE PRODUCTION
WITH A STATE OSCILLATING SPINDLE SANDER



MODEL B4

CHECK THESE FEATURES

- Table tilts 45° by worm and gear device.
- Table quickly returned to exact horizontal position.
- 4″ hand wheel for tilting.
- Oscillating mechanism runs in oil.
- Ball bearing motor enclosed in machine base.
- Rectangular table 20″ x 24″.
- Nine quick change spindles (as shown) ready for use.
- Machine weight 285 lbs.

MODEL D15

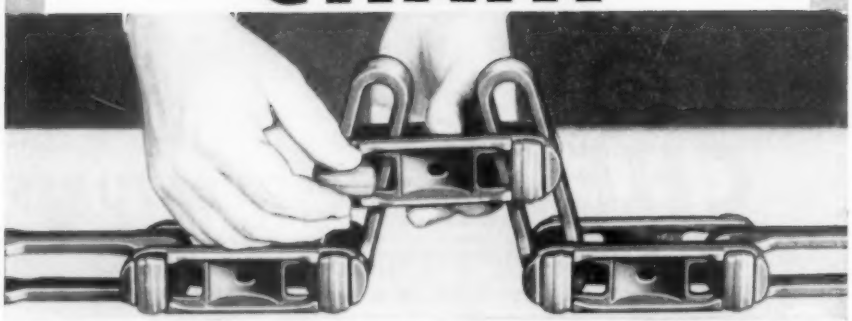
TOPS IN MACHINE VALUE
STATE 15″ & 20″ DISC SANDER

- Large cast iron tables.
- Table quickly returned to exact horizontal position.
- Vertical adjustment of table—center to bottom of disc.
- Furnished with mitre gage, dust bag and extra disc.
- Sturdily constructed heavy weight machines.

Write Now for a complete bulletin

THE FREEMAN SUPPLY CO.
Pattern Shop and Foundry Supplies and Equipment
Mahogany and Pine Pattern Lumber
1152 E. BROADWAY TOLEDO 5, OHIO

A *New* CONVEYOR CHAIN



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- CANNOT TELESCOPE
- WILL NOT COME APART
- GREATER FLEXIBILITY ON VERTICAL BENDS
- INTERCHANGEABLE WITH REGULAR 4″ CHAIN
- ULTIMATE STRENGTH 48,000 POUNDS

Patented X-458 Chain is another triumph in the Jervis B. Webb Company 3-decade history of pioneering in the development of better conveyors.

Thoroughly tested in service, it has proven ideal for overhead, floor type or drag line conveyors.

X-458 Chain cannot telescope or disassemble in service; eliminating that source of damage to conveyor drives. Individual links are stiffer and stronger, yet this chain provides more flexibility in vertical bends.

Drop forged from high carbon steel of 85,000 to 95,000 psi tensile strength, this chain has an ultimate strength of 48,000 pounds. It has exceptional ability to withstand shock loads and is unusually resistant to corrosive and abrasive action.

5261

Let us show you what it will do for you.

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CONVEYOR ENGINEERS and MANUFACTURERS

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WEBB

Offices in Principal Cities

(*Continued from page* 156)

plastic or monolithic lining. Some of the discussion dealt with the question of the most desirable contour of cupola lining.

A question and answer roundtable was conducted by the Steel group, with Floyd S. Sutherland, plant metallurgist, Continental Foundry & Machine Co., East Chicago, Ind., discussion leader. Under the title, "Do You Know?" discussion centered around ten thought-provoking questions which have been the subject of recent articles and papers. Arguments which each of the questions on steel casting practice generated were resolved by Mr. Sutherland on the basis of the latest pertinent findings.—*Erle F. Ross and Howard C. Tuttle.*

Ontario

DIRECTORS and the educational committee of Ontario Chapter of the AFS held a joint meeting Jan. 19 at Hamilton, Ont., under the chairmanship of Russell A. Woods, George F. Pettinos Co. Ltd. Chief item of discussion was the report of the educational committee presented by its chairman, R. H. Williams, Canadian Westinghouse Co., Hamilton.

The committee recently purchased a group of 14 sound films on various foundry practices, a sound projector and a film strip projector. These films are available to foundries and communities to further foundry education. A rental fee of $35 will be charged for the entire group or $3 for each film. During the meeting three films were shown, and those present were well satisfied with the investment. Use of the films to further foundry technique and education is recommended to individual foundries or to groups of foundries in one community.—*Alvin E. Bock, A. E. Bock Foundry Co.*

New England

APPROXIMATELY 300 members and guests attended the annual meeting of the New England Foundrymen's Association held Jan. 12 at the Parker House, Boston. Officers elected for 1949 are: President, Frederick M. Fitzgerald, Draper Corp., Hopedale, Mass.; vice president, Thomas I. Curtin, Waltham Foundry Co., Waltham, Mass.; secretary, Ernest F. Stockwell, Barbour Stockwell Co., Cambridge, Mass.; treasurer, Arthur W. Gibby, East Boston, Mass.

On the executive committee are: Robert C. Walker, Frank R. Elliot, Joseph B. Stazinski, Gordon L. Paul

(*Concluded on page* 160)

Cutting-off Nonferrous Gates and Risers?

Snagging and Slotting C.I. Gears

Try TOUGH, SAFE NORFLEX Cut-off Wheels!

HAVE your operators had trouble with frequent wheel breakage when removing gates and risers from nonferrous castings? Then you'll want to try strong, safe NORFLEX Resinoid Wheels! Sturdy yet flexible, these reinforced Norton wheels are available in diameters ranging from 3" to 20". Because of their high resistance to breakage—fast, soft cutting action—and low rate of wear—they have received widespread acceptance in nonferrous foundries everywhere.

You'll find them safe and handy also, for light snagging jobs requiring thin wheels, and for jobs like slotting C.I. Gears where some twisting, bending and side-pressure are unavoidable. Arrange for a trial with your Norton abrasive engineer or distributor soon.

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Distributors In All Principal Cities

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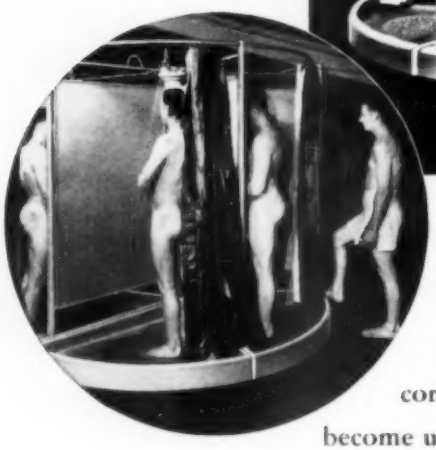
ABRASIVES

W-1231

INSTALL Sanitary Bradley Multi-Stall Showers



FOR GREATER CLEANLINESS

There are no dirt collecting corners, no spaces or crevices to become unsanitary when you complete your washing facilities with Bradley Multi-Stall Showers.

One Bradley 5-Stall Unit with only three supply lines, performs the service of five conventional "single-stall" showers requiring 15 plumbing connections. This feature plus the Bradley *central mixing* chamber make possible considerable savings in hot water expenses and *total* water consumption.

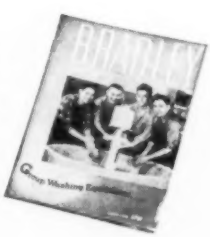
Close-up view of receptor for Bradley Showers. They minimize splashing between compartments and have no corners or dark areas to gather contaminating, odorous dirt.

Easy Installation

Bradley 3- and 5-stall Shower Units come partially assembled for quick, easy installation on any kind of floor including wood. For an economical shower installation and for sanitary showers that will stay clean with minimum upkeep, specify Bradley Multi-Stall. BRADLEY WASHFOUNTAIN CO., 2217 W. Michigan Street, Milwaukee 1, Wis.

BRADLEY *multi-stall showers*

For new ideas on modern washroom arrangements, see illustrated Booklet 4701. Copy on request.



Distributed Through Plumbing Wholesalers

(*Concluded from page* 158)

and Charles A. Reed. An excellent floor show was staged following the dinner. The committee which sponsored the entertainment was headed by Ray Hunter, Foundry Supplies, Boston.—*Walter M. Saunders Jr.*

Tri-State

MEMBERS from three states and several guests were present at the Feb. 18 meeting of the Tri-State Chapter of the AFS held in Tulsa, Okla.

F. W. Burgdorfer, Missouri Pattern Works Inc., St. Louis, discussed plastic patterns and methods of producing plates and boxes, and their application. He offered for inspection several used patterns and boxes, and the members were greatly interested in the strength of the material and the fact that it could be easily repaired. In fact, Mr. Burgdorfer broke one pattern and made the repair during the meeting.—*F. E. Fogg, Acme Foundry & Machine Co.*

Central New York

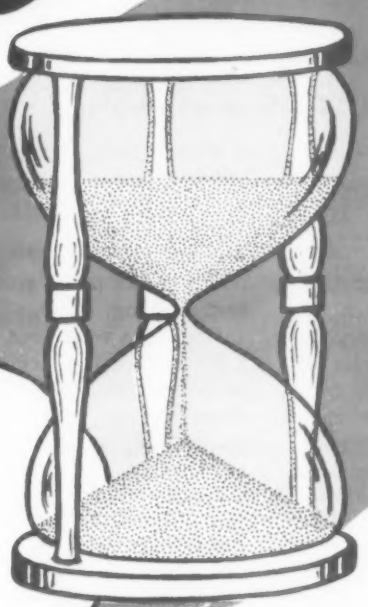
REFRACTORIES was the subject of discussion at the Feb. 11 meeting of the Central New York Chapter of the AFS held at the Onondaga Hotel, Syracuse, N. Y. Before his talk R. J. Denton, eastern representative of the A. P. Green Fire Brick Co., presented a movie produced by the Green company which showed modern methods of processing and manufacturing foundry refractories.

In his discussion, Mr. Denton selected several types of refractory failures and offered suggestions on how to eliminate them. He stressed the necessity of selecting the correct type of refractory material to obtain the properties necessary in a particular application, and pointed out that the fusion point of a refractory material is often not as important a factor in the selection of a refractory as its "workable range."—*J. A. Feola, Crouse-Hinds Co.*

Castings Production In Britain Up

Output of iron castings in Great Britain during the fourth quarter of 1948 was 828,975 tons, and the output of malleable castings was 30,980 tons. The labor force of the British iron foundry industry on Jan. 1, 1949 was 147,859, including 6253 clerical workers. Total production of grey and malleable iron castings for 1948 was 3,283,901 tons, 15 per cent over the 1947 output.

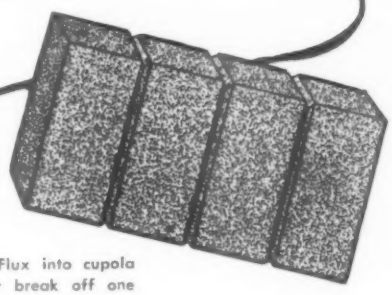
Control



IN THE HOUR GLASS
the size of hole controls the flow of sand.

•

IN CASTINGS
the condition of molten metal controls the quality.



SCORED BRICK FORM
saves time in using.

You simply toss Famous Cornell Flux into cupola with each ton charge of iron or break off one to three briquettes (quarter sections) for smaller charges. This flux does not blow out with the blast but STAYS in melting zone until entirely consumed.

•

MALLEABLE FOUNDRIES, with cupola operation, are showing a rapid trend towards the use of Famous Cornell Cupola Flux. Reports of greatly improved casting production come from every direction. Furthermore, there is a considerable reduction in cupola maintenance labor and cost. The life of cupola lining, whether brick or stone, is greatly prolonged.

PURIFY YOUR METAL, POUR BETTER CASTINGS *by using*

Famous CORNELL CUPOLA FLUX

A trial in your foundry will PROVE this—Metal is hotter and more fluid; sulphur is reduced; castings are sounder, cleaner, and their even grain and freedom from hard spots and hollow centers makes machining definitely easier; rejects are cut amazingly.

Cleaner cupolas, cleaner drops, longer brick life and greatly reduced maintenance cost are other advantages in using Famous Cornell Cupola Flux.

WRITE FOR BULLETIN 46-B

The CLEVELAND FLUX *Company*

1026-1036 MAIN AVENUE, N.W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

Write for Bulletins ➡

Famous CORNELL ALUMINUM FLUX

Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.

Famous CORNELL BRASS FLUX

Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.

Famous CORNELL LADLE FLUX

Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.

Man-to-Man

ON THE MOLDER'S BENCH

"Castings on Display"

By RALPH L. LEE

IT struck me the other day that, except to foundrymen, even the best of castings aren't very interesting for the average person to look at. When we take such folks through a foundry and show them each step in the procedure, it's little wonder that many of them end up in sort of a tailspin as to what they have seen or as to the meaning of what they have seen.

I don't believe there is another type of business in which the manufacture of the product is so hard for the outsider to follow—he doesn't see anything he can recognize so it's hard for him to get a toe-hold. Blocks of sand (sand of all things) with holes in the top—kettles of molten metal being poured into the holes, piles of steaming sand with lumps and hunks of something all mixed together. Strange smells and noises, air hammers, vibrators, tumblers and blowers—probably the biggest conglomeration of odd and unrecognizable mysteries the visitor has ever seen in his life.

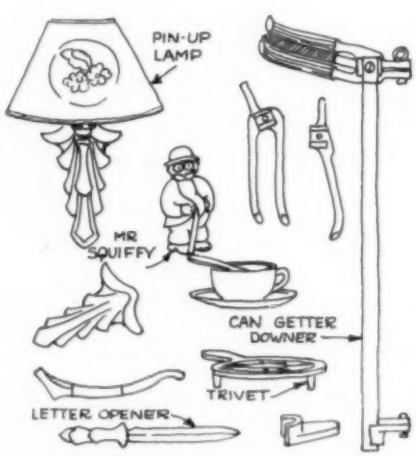
Even with my years of experience as a user of castings and an amateur foundryman I find myself on a trip through a foundry getting sort o' anxious to get to the shipping department so I can see the final outcome of what the shooting was all about. I'd like to get some idea as to the range of the castings being turned out—whether I can recognize those which will go into some finished product I'm familiar with. I get sort of a hard-to-explain bang out of recognizing maybe a piece of the kind of washing machine we use at home, an orange juicer, a food grinder, mixer, sewing machine, furnace, automobile or what have you.

Then too, as an inveterate foundry visitor I'd like to see how the boys are dressing up their finished product before they turn them over to their customers, how they get them ready for shipping, what sort of finish they are putting out and all that sort of thing.

Once in a while, but not very often, I meet some foundry folks who don't make me wait till I get through the plant to see what they are really up to. They have a nice display right out in front, all slicked up clean and attractive; just as though they are proud of what they are doing and don't care who knows about it—even those who can't tell a casting from a shoestring.

In one particular place they told me they make a special effort to show off their display to those they know haven't anything to do with castings or the foundry, for, as they put it, "you can never tell." Maybe these very ignoramuses might some day want to buy some castings or know someone who does.

The reason why I'm going through this rigamarole is that on my last trip out I ran into even more people who are girding up the old loins, so to speak, to go after sales than I did on the trip before. So I guess I'm getting sales conscious. I know when



PRODUCT EXHIBIT
HOBBY FOUNDRY
of Ralph Lee

I was working full time on sales promotion a while back we used to think of DISPLAY and DEMONSTRATION as being two of the most important steps in selling. One of the very first jobs I had in the old lighting plant business was to rig up a plant on the back of a car so the salesman could show people what he was talking about.

Of course, I realize that showing off a lighting plant is a far cry from showing off castings, but on the other hand when you stop to think of it they're not so far apart at that. After all, buying and selling is going on in each case and anyone likes to see what's being talked about.

It just struck me that I'm making the same mistake up there in my little hobby foundry as other foundries do, taking people through the place who don't know anything about the business, bragging about the cupola, how I charge it, tap it and drop the bottom—how I prepare my sand and make the molds, show them the little tumbling mill and all that sort of stuff. Maybe I'll show them some samples of castings if there happen to be some around. Time and again folks who have sorto' fidgeted through the trip have said, "Yes Doc, all that's fine but what do you make here?" Castings, I say. "We got that alright, Doc, but what for, are they for toys, bricabrac, sewer covers or what?" It dawns on me that I've been so interested in making castings that I lose sight of the castings I make.

In the light of what we've been talking about, I believe if I were in the business I'd rig me up a real humdinger display, not only the castings I was running then but any that would help show the range of what we could do in the place. By heck, I believe I'll do it anyway; yes sir, that's what I'm going to do. I'm going to put up a board or a

(*Concluded on page* 164)

LESS · HORSEPOWER REQUIRED with SIMPSON MIXERS

Obviously, the lower horsepower required to do an efficient, thorough sand preparing job, the lower the cost—for power and for maintenance. In Simpson Intensive Mixers, you are assured of the lowest horsepower per ton of properly prepared sand . . . made possible by these engineering features:

In the Simpson, sand lies upon a stationary pan, power being required only for working the sand—by rolling the mullers over the sand which the plows have windrowed into the muller path.

Second, the well-balanced design and precision workmanship of all moving parts reduces friction, which reduces heat, thus requires less horsepower.

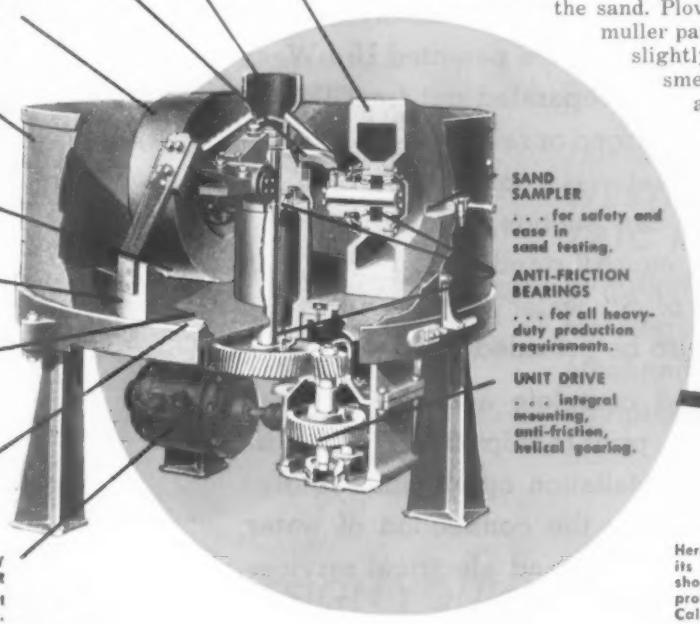
Listed below are some of the advanced engineering features responsible for the dependable, long-life operation of Simpson Mixers in all classes of foundries, on the toughest sand preparation problems.

The Simpson Principle of Mulling

The Simpson principle of mulling, as effected in Simpson Mixers, is the most important factor in holding horsepower requirements, operating costs, and maintenance to a minimum. This principle, which provides the most efficient and economical method of preparing molding sand, offers the advantages of flowability, toughness, elasticity and uniformity of sand not obtained by any other method.

In Simpson Mixers, heavy muller wheels roll over the sand as it lies on the mixer bed, squeezing and kneading the sand. Plows then repile the sand in the muller path. Because the mullers are set slightly off the true radius, the smearing action is intensified . . . and only the Simpson employs this **true** mulling principle.

In the Simpson design, the mullers never approach closer to the bedplate than the diameter of at least ten sand grains . . . thus, there is no possibility of any crushing or grinding action.


VARIABLE MULLER WEIGHT
. . . changeable to suit your conditions.
WATER FUNNEL
. . . for correct water and oil additions.
ROCKER ARM PRINCIPLE
. . full mulling, no grinding.
CHILLED IRON MULLER FACE
. . . five years minimum guarantee.
HIGH CRIB
holds minimum capacity with complete safety.
SMEARING MULLER ACTION
. . . forward and sideways skid.
NECO PLOWS
. . . for longer wear, with wide range of adjustability.
BOTTOM DISCHARGE
. . . for safety and speed . . . available in multiple design
SECTION WEARPLATE
. . . for safety, maintenance and greater mulling efficiency.
INTEGRALLY MOUNTED MOTOR
. . . perfect alignment . . . low maintenance.
SAND SAMPLER
. . . for safety and ease in sand testing.
ANTI-FRICTION BEARINGS
. . . for all heavy-duty production requirements.
UNIT DRIVE
. . . integral mounting, anti-friction, helical gearing.

Here, then, is *controlled* sand mixing at its best . . . let a National Engineer show you how to cut costs and improve product quality with Simpson Mixers. Call or write for complete details.

SIMPSON Intensive MIXERS

NATIONAL *Engineering Company*

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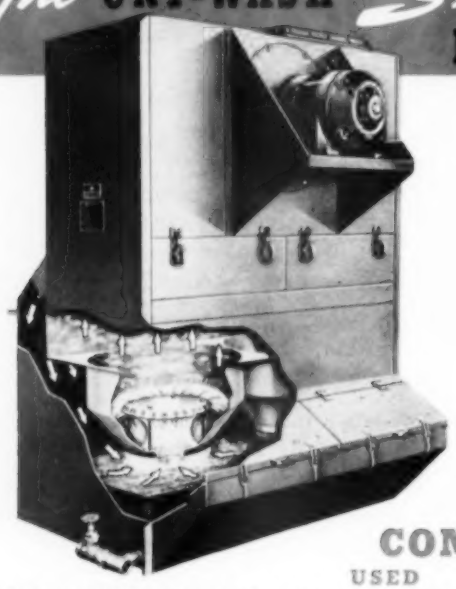
Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

The UNI-WASH Senior DUST COLLECTOR



5,000, 7,500
10,000, 15,000
20,000 C.F.M.
and
GREATER
CAPACITIES

COMPACT
COMPLETE UNITS
USED
INDIVIDUALLY OR IN **COMBINATION**

Uni-Wash "Senior" Dust Collectors have been successfully used to combat dust conditions in almost every industry. They may be used individually or in combination . . . for heavy duty dust collection locally or as part of a complete plant system.

Dust is drawn into the unit, either vertically or horizontally, and water-washed in the patented Uni-Wash system. The water is then separated out from the air and the clean air is discharged or re-circulated through built-in exhaust fan. Water is continuously re-circulated by the exhaust fan suction, thus eliminating pumps, spray nozzles, etc. All standard units maintain static inlet pressure of 5" water gauge. Automatic sludge removal can also be provided.

Each unit is delivered complete and factory-tested prior to shipment. The only installation operations required are the connection of water, drain and electrical services.

Send for **CATALOG**

Catalog contains complete information on both "Junior" and "Senior" collectors. Also has technical information on evaporation and dust count as well as charts to determine collector capacities required. At your request—without obligation. Write Newcomb-Detroit, 5751 Russell St., Detroit 11, Mich.

EST. 1912

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Engineered Systems—Standard Units

Spray Booths • Ovens • Metal Parts Washers • Fans
Dust Collectors • Heaters • Air Handling Equipment

Grand Rapids Div.—Plant	*Main Office and Plant*	*Western Sales*
GRAND RAPIDS 2, MICH.	DETROIT 11, MICH.	CHICAGO 5, ILL.

(*Continued from page* 162)

case with samples of the castings I've made in it. With each one I think I'll put the finished product that casting went into. For instance, take the castings for the pin-up lamp for the family to give away to their friends. I'll hang up the finished lamp, shade and all right alongside the castings. Then there's the trivets, those old fashioned stands they used to put under hot things on the table (the ladies will know what they're for all right). I'll do the same thing with the can-getter-downers, the ones I made for Mother. Then there's the bronze letter opener, the weather vane, foot scraper and the little figure I modeled and cast. Now that I think of it, I'll have a darned nice display.

In telling Mother (that's my better half) about this article I'm writing she said the most interesting thing she had learned about the foundry was when I told her that everything in our house started out originally with a casting, so she thought a display that would help bring this out would be interesting for anyone to look at.

Display Will Pay Off

While I'll have to admit that I'm only an amateur foundryman I did earn my living in the selling business, so I'm not afraid to stick my neck out and say that I feel pretty sure that a good display of our products is bound to pay off. Other businesses do it all the time. If we do fix one up, it won't do any good unless someone looks at it so we ought to show it off to everybody and anybody who will look, even though they don't buy castings. It will also be handy in dealing with folks who do buy castings. It's got to be kept in shape though, for I don't think there's a more forlorn sight than a display that has been forgotten and gone plumb to pot—it's worse than nothing, it's a morgue.

Well, I've gotten this idea off my chest, and good or bad it's been fun thinking about it. I know this, I'm going to put in a display.

Congress Dates Set

Aug. 29 to Sept. 2 has been set as the time for International Foundry Congress, which will be held in Amsterdam, Holland. Meetings of the International Committee of Foundry Technical Associations and the International Committee on Testing Cast Iron also will be held during the congress.

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HOLD BIRMINGHAM CONFERENCE

(*Continued from page* 121)

tioned that considerable work still remained to be done in determining suitable means of introducing magnesium into the iron as well as ascertaining all the mechanical properties of the material since such properties as wear, corrosion resistance, damping capacity, etc., often determine the usefulness of a cast part rather than strength and ductility.

At the first session held in the afternoon with W. E. Jones, Stockham Valve & Fittings Inc., Birmingham, as chairman, an interesting presentation of the application of motion study to improve production and eliminate fatigue of workers was made by W. O. Booth and W. A. McCarthy, Central Foundry Division, Saginaw, Mich. Several demonstrations of inspection and production of cores before and after improvement of methods were given. In hand filing, inspection, and dipping of cores where one core was handled at a time the production was 781 per hour while the improved method, using a fixture to permit use of both hands for filing and dipping cores, increased production to 1485 cores per hour. Similarly, in making cores, a change in bench height, placing of core wires, location of sand and ramming procedure increased production from 480 to 780 cores per hour.

Second afternoon session was presided over by M. D. Neptune, James B. Clow & Sons, Birmingham, with J. Wesley Cable, Thermex Division, Girdler Corp., Louisville, Ky., as the speaker. He discussed "Foundry Core Baking by Dielectric Heating," and pointed out that use of this method of heating is economical only with resin binders. However, he said there is a possibility that a combination of dielectric heating and the conventional oven might be used with oil-sand binders. The dielectric unit would be used to raise the core rapidly to the initial temperature, and the

(*Continued on page* 168)

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Above, left to right—J. Wesley Cable, Thermex Division, Girdler Corp., Louisville; Dr. James T. MacKenzie, American Cast Iron Pipe Co.; Charles K. Donoho, American Cast Iron Pipe Co.; Thomas H. Benners Jr., T. H. Benners & Co.; C. P. Caldwell, Caldwell Foundry & Machine Co. Inc., conference chairman, and Sam Carter, American Cast Iron Pipe Co., co-chairman

(*Continued from page* 166)

remainder of the operation performed in the regular oven. Mr. Cable explained that heat is generated uniformly throughout the core by the distortion of the molecules of a material exposed to an electrical field. Dielectric unit consists of two plates or electrodes between which the electrical energy passes at high voltage and rapid changes in polarity.

A number of resins have been found suitable for binders, including urea formaldehyde, phenol formaldehyde, melamines and resorcinols. Baking time may range from 20 seconds to several minutes depending on core section thickness. Since metal distorts the electrical field in a dielectric unit metal core plates and driers cannot be used. However, core wires if laid horizontal, or vertically if not too high, and some chills may be used in the cores. A recent development for core driers is polyethylene resin which may be cast to the desired shape. For general purpose

(*Concluded on page* 170)

Top, left to right—W. A. McCarthy, Saginaw, Malleable Iron Plant; W. E. Jones, Stockham Pipe Fittings Co., and W. O. Booth, Saginaw Malleable Iron Plant

Center—Herbert F. Scobie, AFS; D. C. McMahen, Harbison-Walker Refractories Co., and Fred K. Brown, Adams Rowe & Norman Inc.

Bottom—C. P. Caldwell, Caldwell Foundry & Machine Co.; W. Guy Bagley, Woodward Iron Co.; William B. Wallis, Pittsburgh Lectromelt Furnace Co.; Fred K. Brown, Adams Rowe & Norman Inc., and Ben W. Worthington, McWane Cast Iron Pipe Co.

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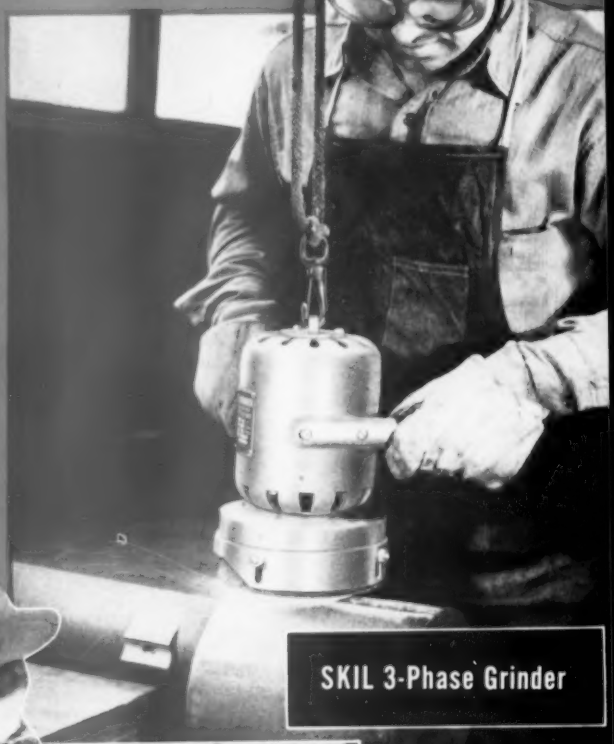

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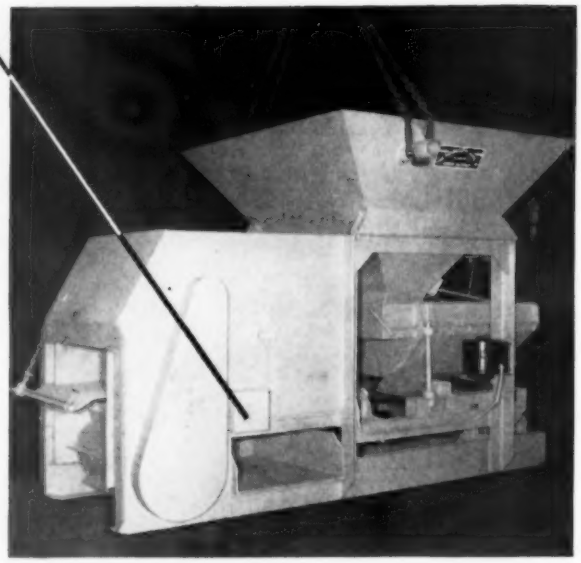
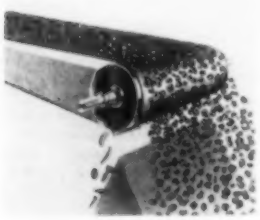


TAKE a tip from Beardsley & Piper engineers . . . to get *all* the tramp iron from foundry sand they specified Dings "High Intensity" Magnetic Pulleys as standard equipment on their new sand conditioner. Whatever *your* iron separation problem . . . from removing gaggers, sprues, risers, wires and iron scrap from foundry sand . . . separating ferrous from non-ferrous metals . . . to designing new equipment . . . Dings powerful magnetic pulleys are the answer. You get fully automatic removal and discharge of tramp iron without manual attention and maximum separation capacity at all times.



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Dings "HIGH INTENSITY"

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(*Concluded from page* 168)

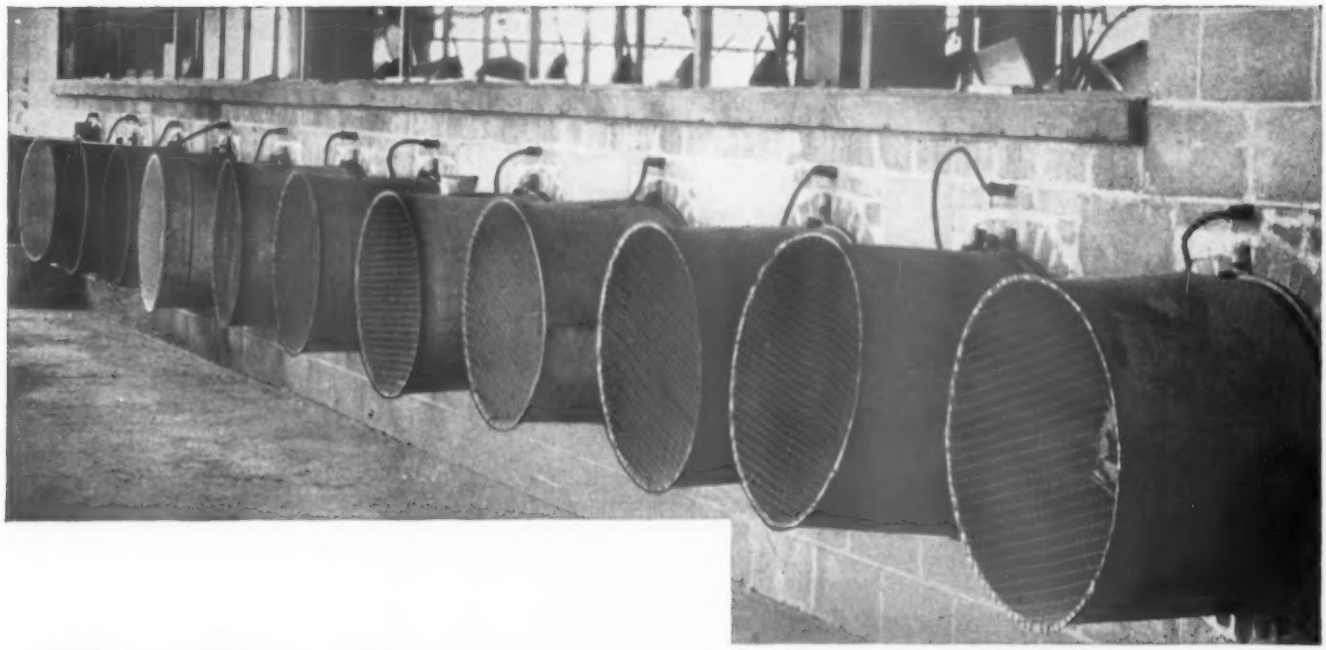
cores Mr. Cable suggested the following formulation: 500 lb 70 mesh silica sand, 11 lb urea formaldehyde base resin, 4½ lb cereal, 1¼ lb boric acid, 2½ qt kerosene, and 8 qt water.

Friday morning was devoted to plant visitations to various foundries in the Birmingham district. In the afternoon two sessions were held. The first, with John F. Wakeland, Alabama Foundry Co., Birmingham, presiding, comprised a color motion picture entitled "Gating Systems for Castings" which was explained by W. H. Johnson, Naval Research Laboratory, Washington. It depicted the action of various types of gates introducing molten steel into mold cavities. Surprising feature of the film was that the entry of metal into the mold was different than what was expected. For example, with finger gates the one farthest from the sprue fed practically all of the metal into the cavity up to the point that the metal covered the gates. Similarly in the case of step gates, little if any metal flowed from the upper branch gates up to the time they were covered by molten metal in the cavity.

Second afternoon session was held under the direction of Howard Nelson, Hill & Griffith Co., Birmingham. Harry W. Dietert, Harry W. Dietert Co., Detroit, the speaker, pointed out that sand control is important in the foundry because its business is to make better castings at a profit, to make castings without defects, and to make them with the best possible finish. Sand control is obtained by standardization of the incoming material, mixing, and molding procedures. Testing for control is predicated on determination of sand properties at room temperature, when the sand is dry, and when it is at elevated temperature.

Casting defects occur when the sand properties are either in the high or low range, and he pointed out that a dry strength between 20 and 80 psi usually gives good results. For example, when the dry strength is above 80 psi at 500° F scabbing is encountered while at 1000° F with the same strength rat tails and buckles occur. At 2000° F sand with a hot strength of 20 psi results in dirty castings while with a strength of 80 psi rat tails and buckles result. Reduction of hot strength may be secured by addition of such materials as wood flour and cereal binder.

At the end of his talk Mr. Dietert presented a color motion picture showing the effect of different types of atmospheres at high temperatures on steel pins imbedded in sand.



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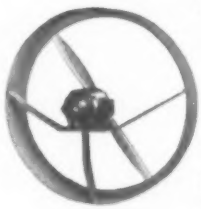

45 Propellair intake fans, installed along a freight-loading platform, were the quick, economical answer. The fan intake system creates a positive pressure within the building. This forces hot air out of skylights and exhaust fans in the roof. Incoming air is circulated to cool both castings and personnel.

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Casting... LARGE WHEELS AND DRUMS

By PAT DWYER
Engineering Editor
THE FOUNDRY

A RECENT inquiry from a reader on the subject of casting large wheels having a gray iron rim and hub and wrought iron spokes, prompts rather extended comment. Rim of the wheel in question was to be of sufficient hardness to withstand considerable wear and also maintain good traction. Spokes were to be wrought iron 1 x 2½ in., anchored at the ends in the rim and hub. Since this type of casting was outside the inquirer's experience he sought advice on the required patternmaking and molding practice, gating and pouring, and—on account of the expansion and contraction of the parts—inquired regarding the feasibility of casting rim and hub in the run of an ordinary two-hour heat.

Taking the last item first, it is *not* feasible to cast the rim and hub of a large spoke wheel during an ordinary two-hour heat. Theoretically, it might be possible to pour the rim with the first iron, strip all the sand away from the outside a short time afterward and then spray water on the face until the casting has cooled to the limit of contraction. Then pour the hub at the last of the heat.

However, the method is not practical. Application of the required volume of water would convert all the sand in the vicinity into a bog. A few careless squirts from the hose would soak the inner part of the mold containing the hub cores. Without a special piping device it would be impossible to apply a steady and uniform stream of water to the entire face of the casting. Without uniform contraction, the casting would not contract to a true circle. In ordinary practice, and in shops where these wheels are made, the rim is cast one day and the hub is cast on the following day. This procedure easily and automatically disposes of the expansion and contraction problem.

An excellent rig for making castings of this kind may be adapted to small and large wheels. The method was developed in a prominent eastern foundry for making cast iron drums of 8-ft diameter 8-ft face. For convenience in handling, the casting was made in two sections. The casting was larger than the road roller wheels under consideration, but the method may be adapted to the production of the smaller wheels. The method was described and illustrated many years ago in THE FOUNDRY. Following is a slightly abridged version:

For convenience in handling, and on account of the metal thickness and the fact that the face had to finish perfectly clean and smooth, the casting was made in two parts and later bolted together through an internal flange. In addition to producing castings true to shape and accurate dimensions, the adopted method permitted turning out one casting a day until the order for 20 was completed.

Required rigging for making the castings included two heavy lifting plates for supporting the body of sand forming the interior of the mold. Plates were employed on alternate days, one in the core oven and one in the mold. Each plate was tapered to a 60-degree angle on the edge to facilitate lifting it into and out of the core print, and was provided with four strong hooks to which the crane chains were attached. The hooks were spaced in a manner to clear the body of sand forming the core. When they bent inward a little under the pull of the crane they did not disturb the sand.

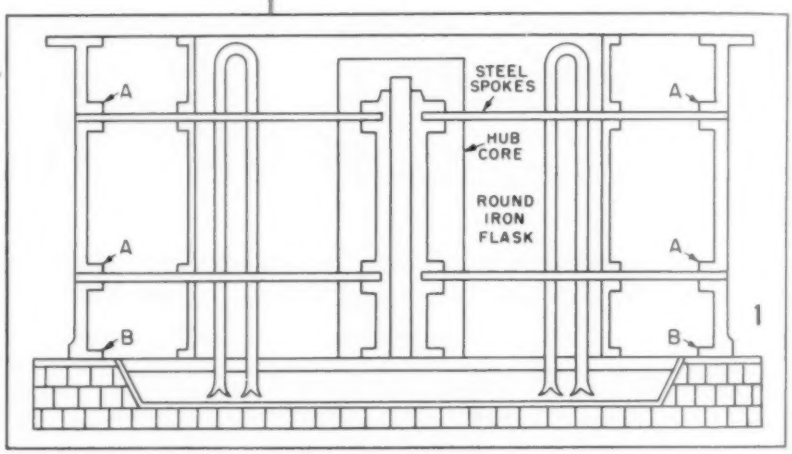


Fig. 1—In this method for molding an 8-ft diam cast iron drum, the outside of mold was made in a pit in the floor. The inside was made in a cast iron corebox. The hub core was split vertically instead of horizontally as shown in Fig. 2

Other rigging included one cast iron corebox machined on the inside and provided with 16 small openings corresponding to the position of the outer spoke ends. The corebox was cast in a loam mold and the spoke openings were cored in place instead of being drilled. In this instance the small cores were placed so accurately by the molder that no tampering was

needed in the machine shop. Four lugs, spaced equidistantly on the outside of the upper edge, served as handles in lifting the corebox from the core, and and in transporting it from place to place. A taper of ⅛-in. was turned on the inside face of the corebox; this served the double purpose of facilitating the removal of the box from the core, and also compensated for the strain on the lower part of the mold and core while the mold was filling with iron.

Outside part of the mold was made in a pit in the floor and dried in place. Beyond a coat of blacking and a little patching occasionally, the outside wall of the mold required no further treatment, and served for the entire lot of 20 castings. The contraction was sufficient to clear the casting from the face of the mold. By adjusting the chains to lift the casting plumb, the mold wall was not disturbed. On account of the arms it was necessary to provide an entire new core for each casting.

A seat was swept flush with the floor level on which to ram the cores. Instead of the usual loam coating, a thickness of cement was spread on the brick work and finished smoothly to form a seat for the lifting plate and another for the lower edge of the corebox. The general arrangement is illustrated in Fig. 1, a sectional view of the corebox and core.

The core print was made 2 in. deeper than the lifting plate to provide a 2-in. thickness of sand on top of the latter. Principal reason for this was to make room for the slab core designed to form the flange end of the hub. The two halves of the casting were bolted together through a flange on the hub and an internal flange on the rim. A second reason for keeping the lifting plate below the level of the corebox was to provide a seat for the core that would seal the opening and prevent any iron from leaking down under the plate.

The iron corebox was adjusted in place on the cement finished seat. The lifting plate then was lowered into position. Sand was rammed to the top of the plate and struck off level with the horizontal parting line *B*, Fig. 1. The slab for the bottom face of the hub was located in the center and with the face flush with the green sand face. In this manner the lower face of the hub and the lower face of the drum rim were sure to come on the same plane and no difficulty would be presented in the machining operation preparatory to joining the two halves of the drum together.

The upper internal flange was cast integrally with the corebox. The lower flange was made up of a number of wood segments adjusted in place by laying the flat segments on the flat parting shown at *B*, Fig. 1, and then pushing them close to the iron ring. A row of rods was rammed over the flange all around to support the sand after the segments were removed.

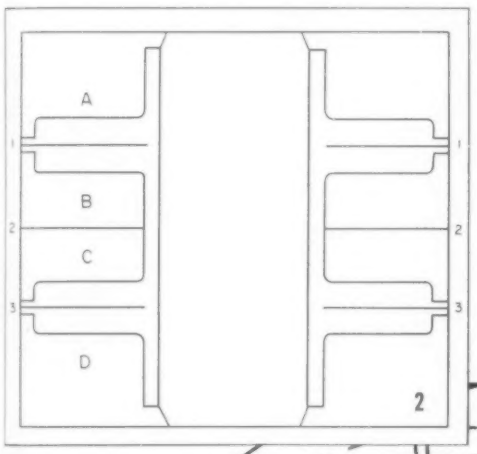
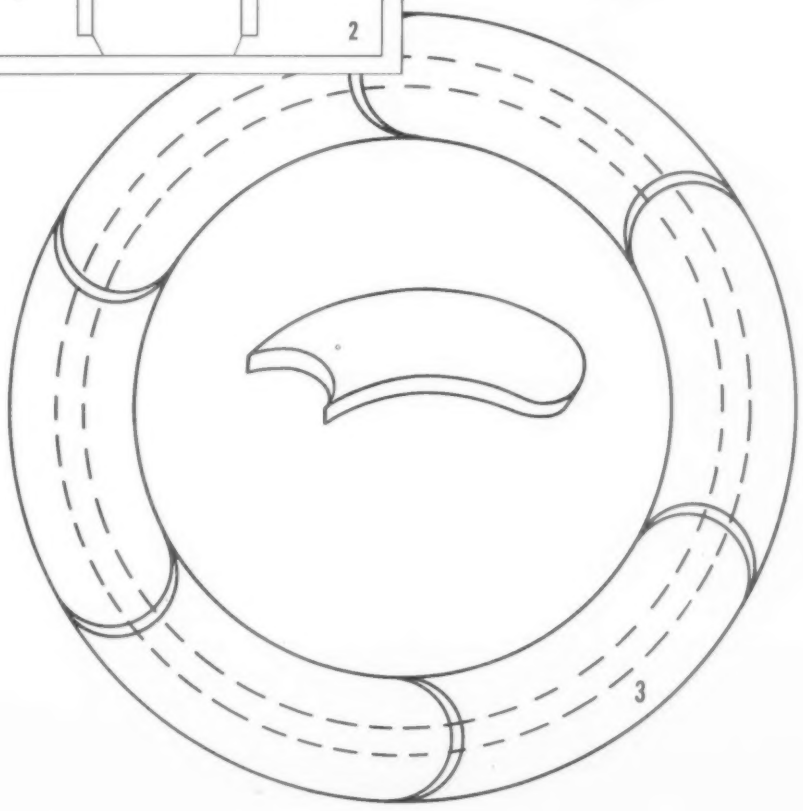


Fig. 2—In this unusual assembly, the four units are made in two coreboxes. Cores *A* and *D* are interchangeable, and may be used either on the top or the bottom. Cores *C* and *B* also are interchangeable. Thickness of cores *B* and *C* correspond to the required position of the upper and lower sets of spokes

Fig. 3—Flat cover cores may be adjusted to fit widely varying circles



Parts Cast on Succeeding Days

A ring 8-ft. in diameter contracts approximately 1 in. while cooling. This means that in wheels of this character where the cast iron rim and cast iron hub are connected by wrought iron or steel spokes, it is necessary to cast the rim one day and the hub on the following day. Metal in the hub contracts somewhat, but the only effect is to place a slight tension on the spokes.

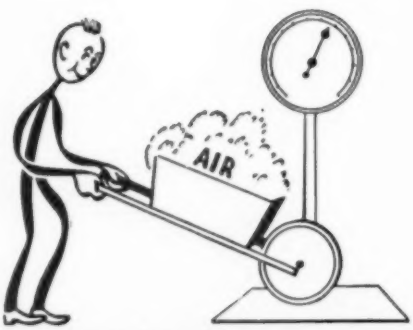
To prevent the steam and gas generated during the pouring process from surrounding and permeating the hub core, three iron flasks rings were rammed up between the face of the corebox and the hub cores. In addition to preventing the steam from working through, the flasks reduced the amount of sand required for each core and correspondingly reduced the time occupied in making the core. The flask rings were set one at a time as the ramming progressed and in a manner that did not interfere with setting the spokes. The top and bottom rings readily were removed from the casting in the cleaning room. The center ring had to be cut in two before it could be removed from between the arms. The same set of rings served for all drums.

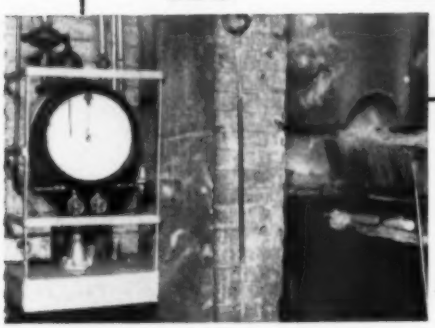
One half core box served to make all the hub cores. Usually in wheels of this kind the hub core is made

(*Continued on page* 175)

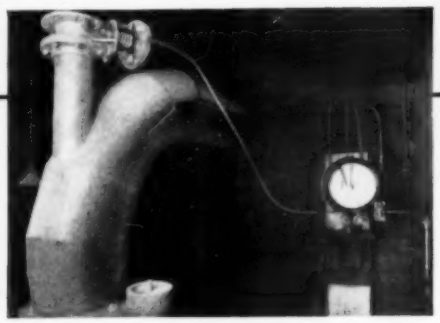
EASIEST WAY

to beat high Foundry Production Costs

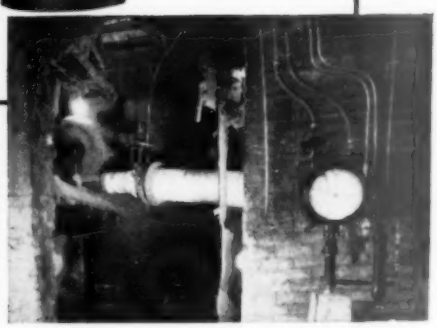




1 **Heating Equipment Foundryman** *states: "This control gives uniform hot iron with absolute control of all mixtures. It has also decreased our melting time 45 to 60 minutes per heat."*



2 **Grey Iron Foundryman** *reports: "Its automatic control of blast gives us uniformity hot iron all day long, regardless of air temperature."*



3 **Piston Ring Foundryman** *says: "Air-Weight Control has enabled us to cut our scrap from 16% to 8%, saving 500 lbs. of iron pigging before starting to cast."*

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FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**

(*Continued from page* 173)

in a number of sections, which are built on top of each other. In this instance the hub core was considered as a unit and split in two vertically. Afterward, the two halves were pasted and also bolted together through projecting lugs on the arbors. Suitable hooks were provided on top of the core for conveying it from the core room and lowering it into the mold.

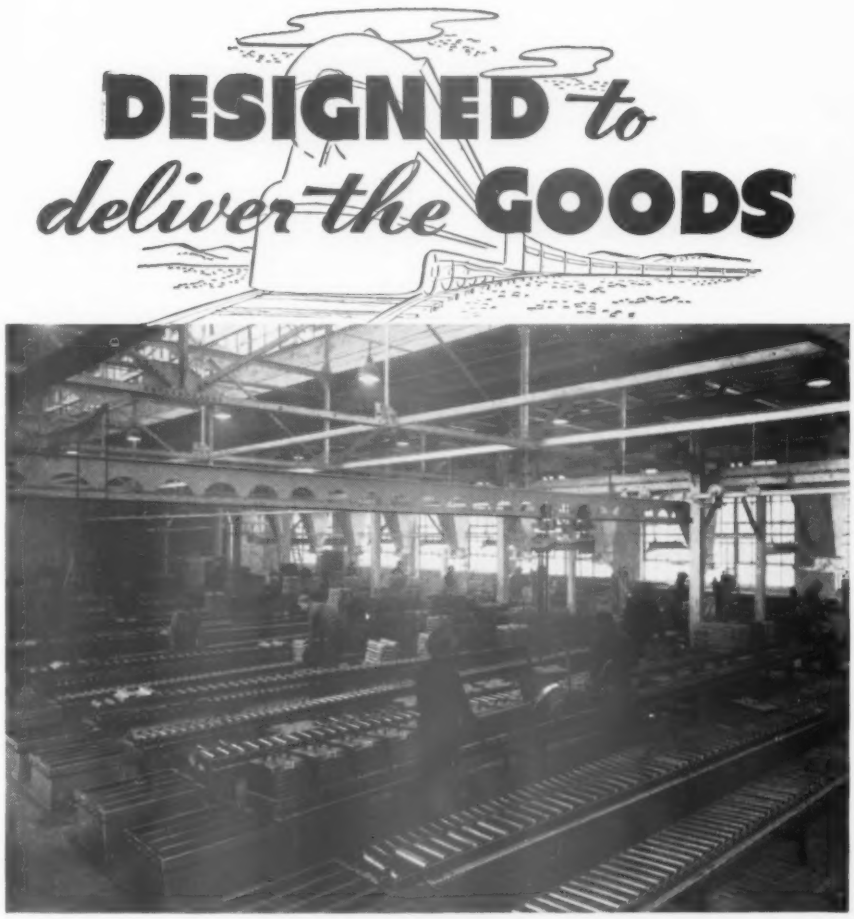
For this casting, the spokes were cut from steel pipe and plugged at each end to prevent entrance of any stray iron. A ¼-in. hole was drilled through each spoke about half way between rim and hub, to allow heated air to escape. The wood hubs *A A*, Fig. 1, on the rim end of the arms were located automatically and held in place by sliding the spokes through them. The outer end of each arm rested in the opening in the corebox. The inner end rested in a corresponding opening in the hub core. After the core was rammed to the top, the spokes were pushed in far enough to clear the corebox, which then was rapped and removed. With the corebox out of the way, the wood hubs were drawn out of the sand. The segments forming the lower flange were drawn in the same manner. The cores were blackwashed and placed in the oven. A plain loam plate designed to serve as a cope also was placed in the oven.

Core Arranged To Hang Plumb

In assembling the mold, the drag was brushed clean and prepared for the reception of the core by sprinkling a little flour on the core seat. The core was lifted off the car by four chains suspended from the crane and terminating in turnbuckles by which the load might be adjusted to hang perfectly plumb and level. Four sticks, 4 ft in length, square in cross section and a little less in thickness than the required thickness of the wall of the casting, were spaced upright and equidistantly close to the wall of the drag. The sticks guided the core into its place in the center. The core was lifted out once so that the man in charge of the job might satisfy himself that it fitted properly around the lower edge. If necessary, any little depressions were filled. A dough worm was laid in a ring around the bottom and the core was lowered back into place.

The plain loamed cover plate was provided with eight 3 x 6-in. openings spaced equidistantly on the 8-ft circle. A runner stick, ½ x 2-in., was

(*Continued on page* 178)



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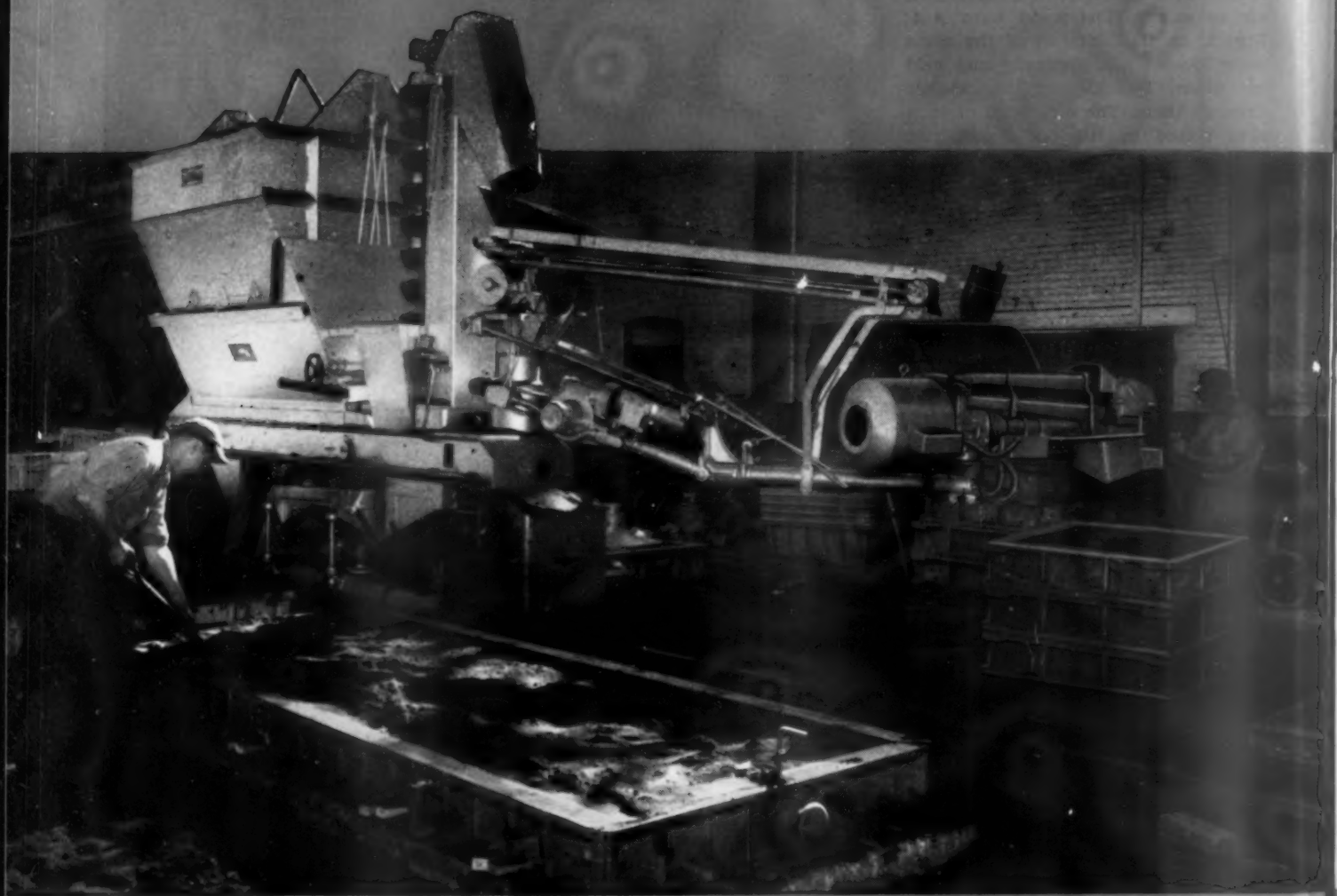

American's Motive Jr. Sandslinger travels on a track about 90 ft. in length, ramming molds on both sides of the track. The long ramming arms raise and lower, providing extreme flexibility in ramming molds of widely varying heights.

y Machinery Foundry ROCHESTER, N. Y.

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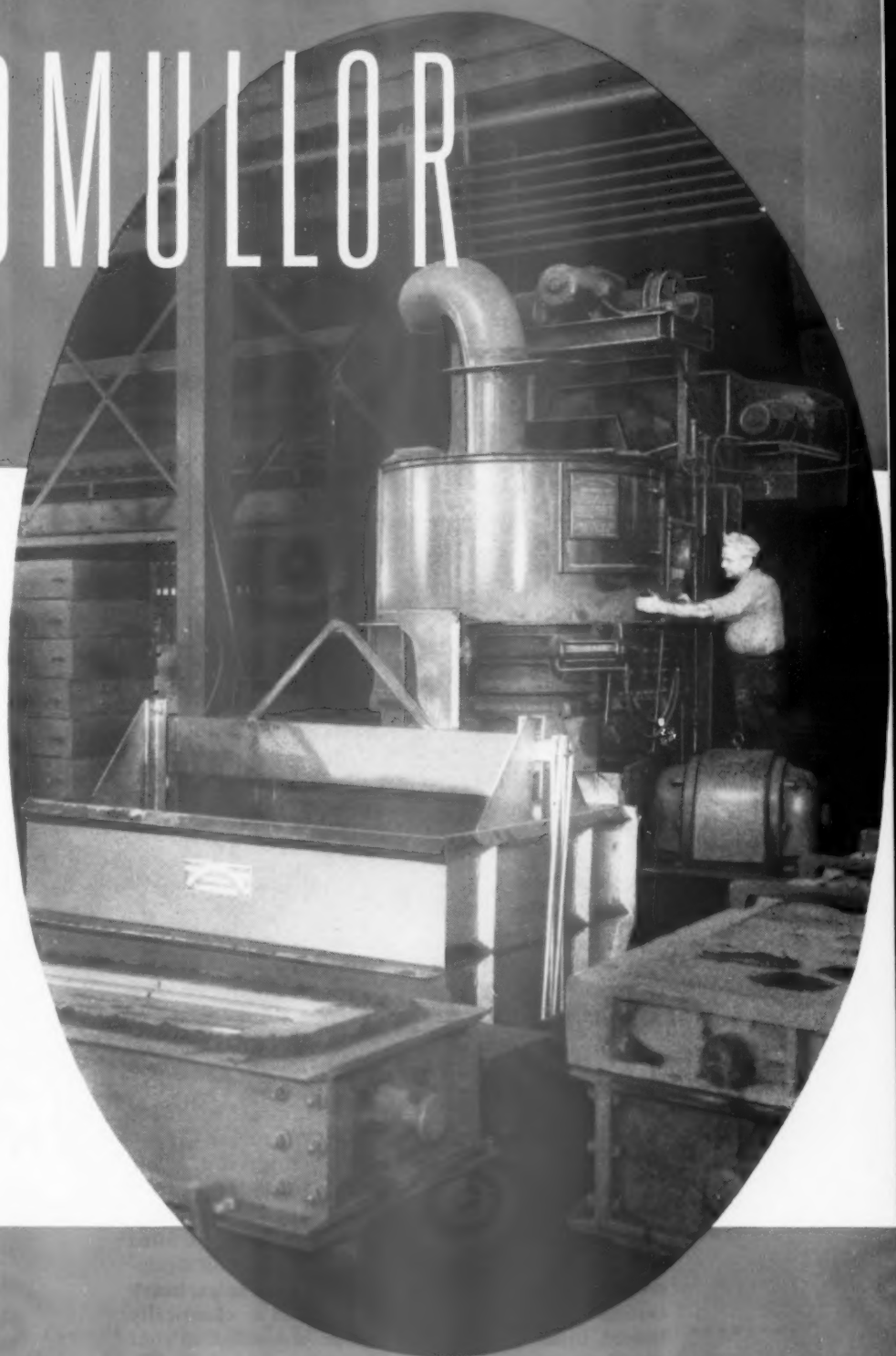

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A 1100 lb. extractor cone casting mold 56″ x 56″ x 48″ . . . Sandslinger ramming time—3 minutes

150 tons of sand per day—completely mulled and simultaneously cooled in 1½ minute mulling cycles.

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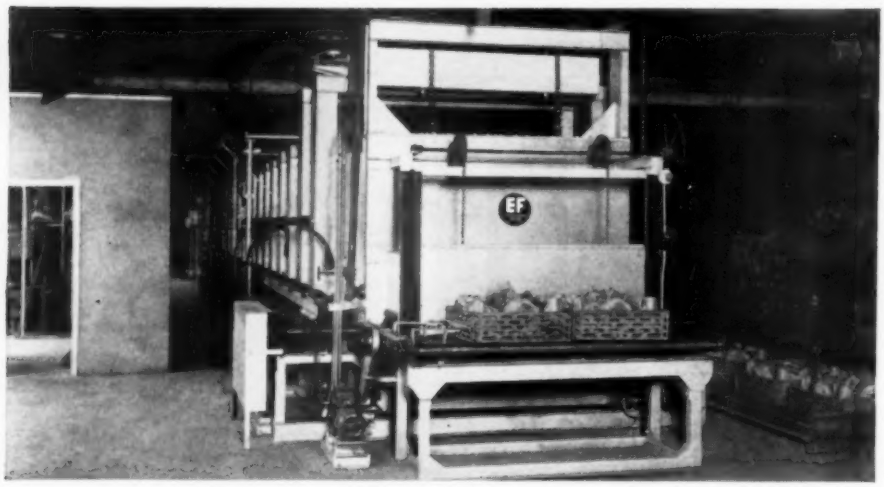
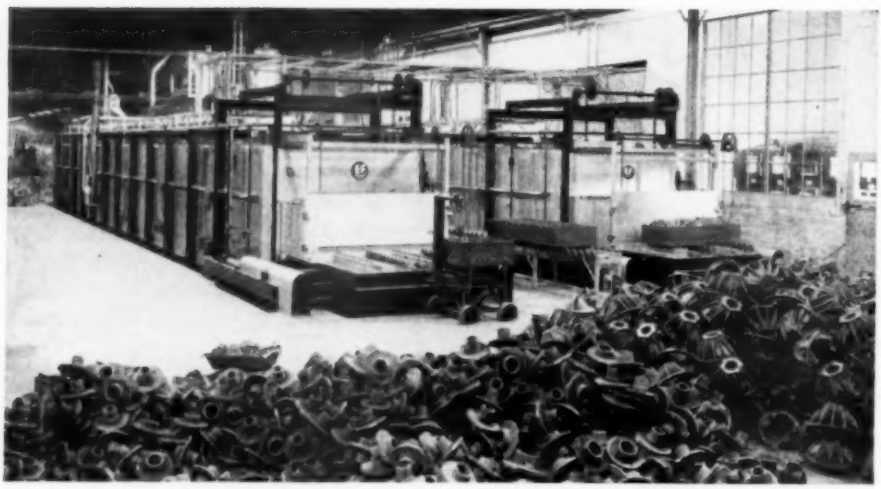
Mulling and cooling in 1½ minute cycles, this Model "60" Speedmullor completely cools hot shakeout sand as it mulls. The Speedmullor discharges sand directly into the Motive Jr. Sandslinger portable hopper in the foreground.

EF MALLEABLE FURNACES



SHORTEN THE CYCLE



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(*Continued from page* 175)

adjusted in the center of each opening. After the opening was filled with loam and the upper face slicked, the runner sticks were removed. No seat was provided as a guide in locating the cover plate. A man stood by each of the four handles of the plate as it descended. By holding a small rod suspended through one of the gate openings, he determined when the gate was in line with the vertical cavity in the mold. Absolute accuracy was not essential, since the face of the plate was perfectly flat. The gates were spaced as nearly as possible to come in front of each arm and thus furnish hot iron to fuse the ends and insure a firm grip.

The runner basin was made up of two rings, one inside the gate openings and the other on the outside. Gate sticks were inserted in the various openings while the basin was being made up in green sand. A few roll chills were set on for weights and the casting was poured. On the following day the casting was lifted out of the mold and set down at another point on the floor, where the hub was poured.

Method Good for Large Number

The foregoing method and equipment may be regarded as satisfactory where a large, or even a comparatively large number of castings are ordered. Obviously, the initial pattern expense is not economical where only one or a few castings are ordered.

Alternative methods include: 1. Two sweeps are provided. One forms the inside or core. The other forms the outside. The mold must be separated to adjust the spokes, but it is immaterial whether the outside is lifted away on a ring, or the inside is lifted out on a plate.

2. An entire wood pattern is provided. Wood bosses are attached loosely in the usual manner. Screws, nails or pins are removed in succession as the ramming progresses. At this point it is pertinent to point out that any large pattern ring, wood or metal, easily goes out of round. The pattern should be checked with diameter sticks at regular intervals.

3. The inside of the core is formed with a sweep. The outside is formed by a number of dry sand cores, slightly curved on the inside face and flat on the outside. These cores are set up around the inside part of the mold. A shoulder at the bottom and a second shoulder at the top regulate the metal thickness of the casting rim. Sand is rammed around the cores to hold them in place. Where a round flask is available, the

lower part of the upright cores is braced from the flask wall with small blocks and wedges.

While a flat-face green or dry sand cope, or a loamed plate, may be employed to cover one of these molds, many foundrymen prefer a set of thin, flat dry sand cores, with male and female ends which enable the operator to arrange them in circles of widely varying diameters (Fig. 3). In the event that the total core length is not a multiple of the desired circumference the male end in the corebox may be moved forward for the last core in the ring. The cores are wedged under the bars in a suitable cope. Then the cope is weighted down and runner basin is made up in the usual manner.

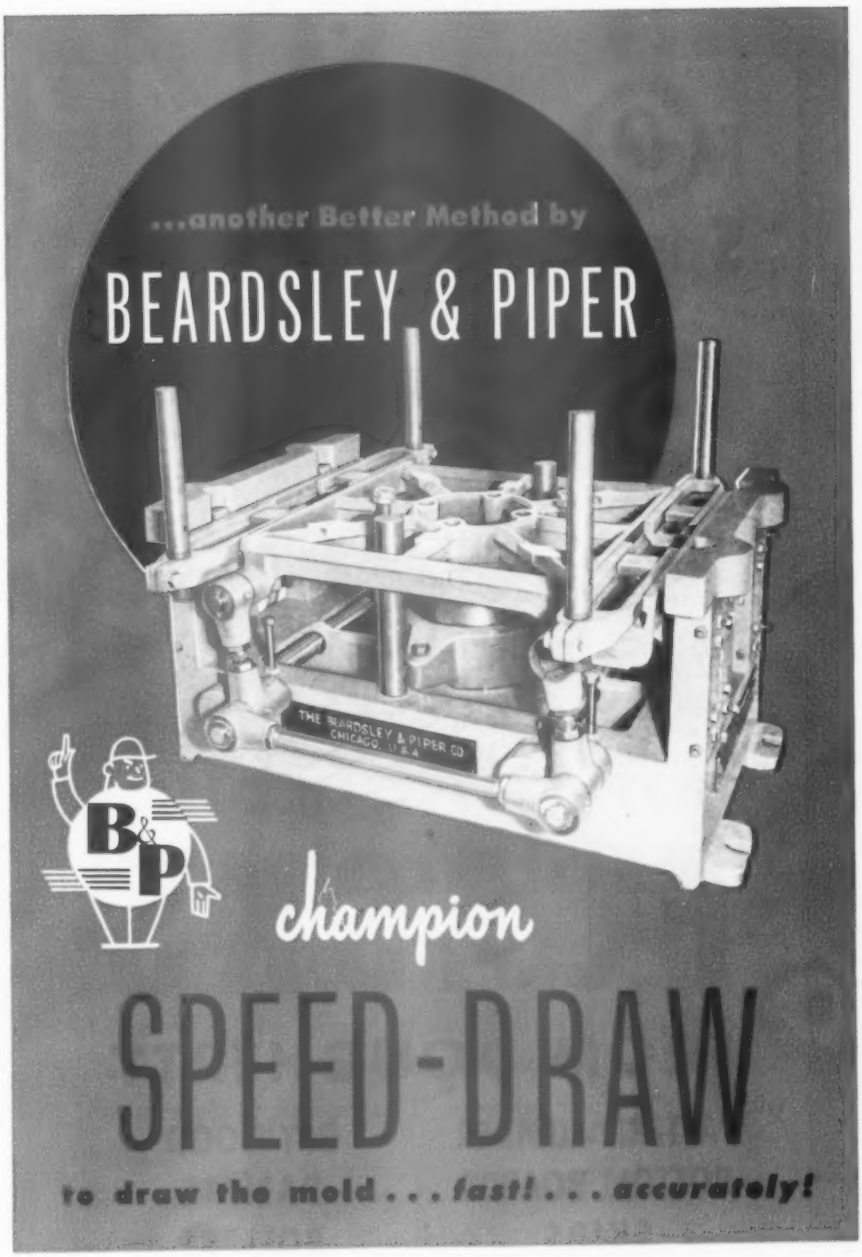
Fig. 2, not drawn to scale, shows the style of hub core assembly usually employed on steel spoke wheels. The core is in four parts, *A*, *B*, *C* and *D*, and the parts are made in two coreboxes. By reversing positions, *A* serves for either bottom or top. In the same manner *B* and *C* are interchangeable. This arrangement permits insertion of the spokes at 1 and 3. Thickness of cores *B* and *C* is regulated by the required distance between the lower and upper sets of spokes. Several methods of molding a somewhat similar drum casting, but without the steel spokes, were described and illustrated in the August, 1917 issue of THE FOUNDRY.

LOW-TEMPERATURE IMPACT STRENGTH OF CAST STEELS

(*Continued from page* 77)

Heats finished in this manner possessed very erratic notch toughness at −20°F.

On two heats the silicon block was retained in the furnace and 4 lb per ton of ferrocarbon-titanium were added in the ladle. This extra deoxidizer did not refine the grain sufficiently to provide the desired impact strength at low temperature. However, ductility was good and only Type I inclusions were present. Based on the experience with the higher carbon steels, it was decided that the combination of calcium alloy and titanium alloy might also prove satisfactory on the lower carbon grade. Since the oxygen content of the low-carbon steel would be greater, an experimental series of heats was made in which 4 lb per ton of calcium-manganese-silicon and 4 lb per ton of ferrocarbon-titanium were added. Results of this experimental series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of heats are given in Table VI. Grain size was sufficiently fine, low temperature impact strength was excellent, and static ductility was high.

Table II summarizes results on 14 heats made by the old practice and 16 heats made by the new practice. The use of the combination of calcium alloy and titanium alloy provided consistently finer grain size and high impact strength at low temperature without impairing the ductility of the steel. Fig. 7 is representative of the normalized grain size secured with the old deoxidation practice, and Fig. 8 is representative of the fine grain size resulting from the new deoxidation practice. As in the case of the higher carbon heats, experience with production heats showed that the addition of calcium-manganese-silicon improved the fluidity of the metal.

Summary—A program of development work on the ladle deoxidation of acid open-hearth steel was instituted for the purpose of producing castings possessing good static ductility and consistent low temperature notch toughness. On 0.40-0.50 per cent carbon steels, the use of a combination of 4 lb per ton of calcium-manganese-silicon and 4 lb per ton of ferrocarbon-titanium was found to provide satisfactory results. On 0.20-0.30 per cent carbon steels, the use of a combination of 4 lb per ton of calcium-manganese-silicon and 4 lb per ton of ferrocarbon-titanium provided steel which met the specifications. In both cases the addition of calcium-manganese-silicon resulted in an improvement in the fluidity of the steel during teeming.

Book Review

Depreciation Policy When Price Levels Change, published by Controllership Foundation Inc., New York, paper, 85 pages, 8½ x 11 in. Price $2.

Specifically not a presentation of original research, this report is intended as a service to business by abstracting and placing in a logical pattern the principal authoritative opinions and collections of information.

The material was assembled and abstracted by Prof. T. F. Bradshaw, Graduate School of Business Administration, Harvard University, with Charles C. Hull, educational director, Controllers Institute, acting in an advisory capacity. The project was undertaken in an effort to help the original research and careful thinking of others to reach the point of application in the decisions of management.

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MANHATTAN RUBBER DIVISION PASSAIC, NEW JERSEY

NEED FOR FOUNDRY EDUCATIONAL PROGRAMS

(*Continued from page* 85)

will have to have better trained organizations from every standpoint.

Another point—it certainly would not be necessary to replace any management employees in the industry to accomplish what I am going to talk about. Every year in excess of 2000 supervisors, engineers, or others in the management group leave the industry for one reason or another. And certainly concentrating on better trained people to replace them would tend to improve our organizations tremendously.

A few facts should prove the importance of getting engineering schools to include foundry educational programs as a part of their curriculum.

In 1910 there were 80,000 practicing engineers in the country who exercised a relatively light control over the industrial activities of the nation. In 1948 this number had grown to 325,000, and the chances are that practically all of the castings used in this country are specified and bought by men in this group. As a result, the real customers of the foundry are all included in this figure.

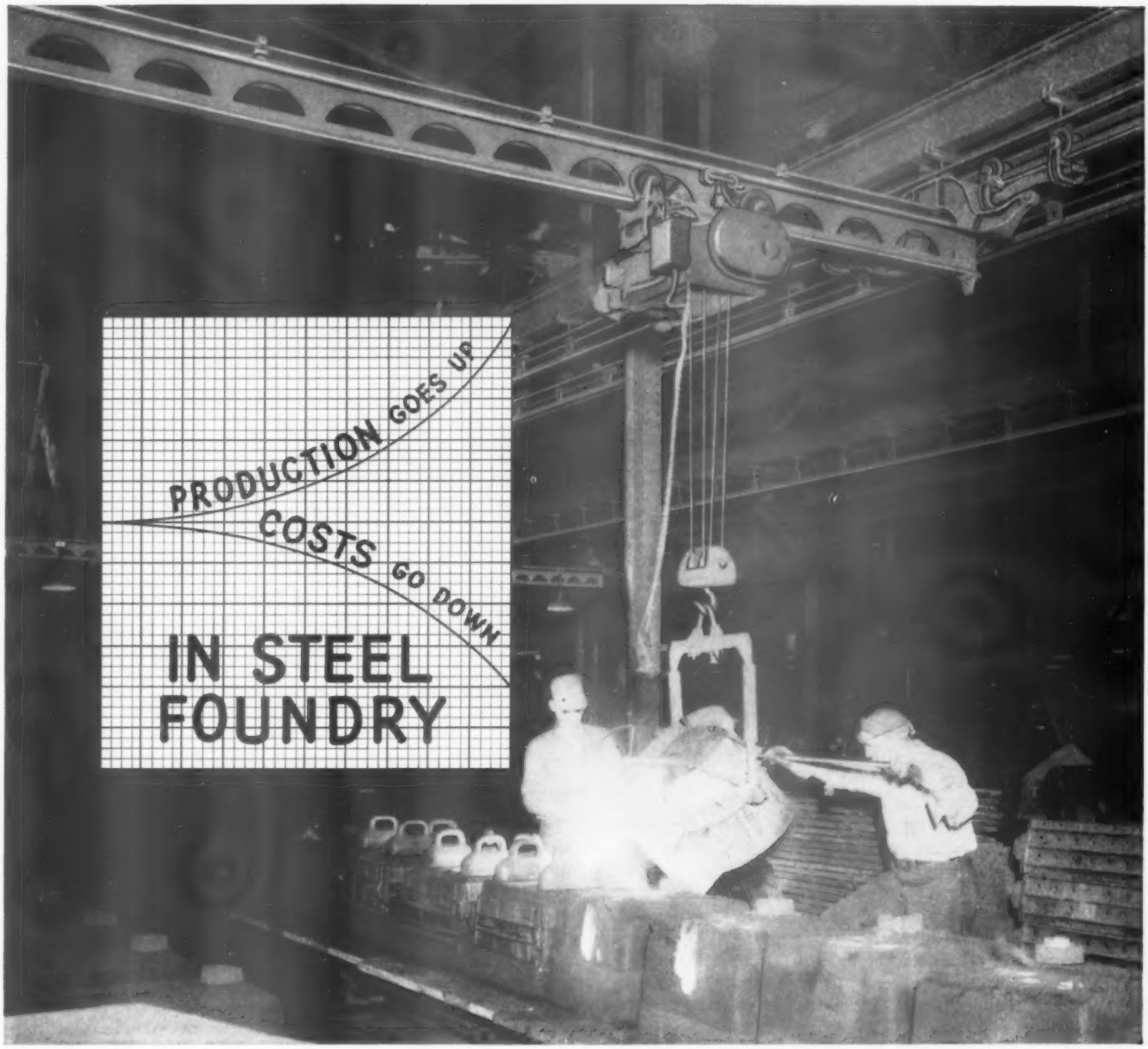
Methods Are Unsatisfactory

In 1948 it is estimated that 50,000 engineers were graduated from the nation's colleges. These came out of 125 engineering schools. As close as can be calculated, only 7000 of these had some contact with the foundry, either through laboratory work or lectures during their college years. It is our surmise that a good deal of this contact was very crude and not representative of the precision and quality which characterized the bulk of today's foundry operations. In plain English, the universities turned out a group of anti-customers in the same manner as has been done for the past 30 or 40 years.

Of further interest and considerable concern to us is the fact that probably not more than 200 of these graduates went into the foundry industry. This means that only 2/5 of 1 per cent of the new engineering talent has elected the fifth largest durable goods industry in the country for their career. This is probably due to the fact that they do not realize the opportunities the foundry industry has to offer, and up to the last year or so we have done little to let them know.

It is estimated that during the

(*Continued on page* 184)



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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

(*Continued from page* 182)

next ten years (allowing for normal shifting and electing of careers other than engineering), some 300,000 new engineers will enter American industry and will become the men who will be responsible for the selection and use of castings.

We have a tremendous job to do as far as trying to broaden the programs of engineering schools to include in their curricula subjects which will give all graduating engineers a better idea of what benefits can be derived from using cast materials.

The second thought on this subject—to build up our supervisory personnel by encouraging better trained young men to come into the industry and to give further training to the supervisors we now have—is one to which all industry must pay a great deal more attention if we are to handle our labor relations problems in a satisfactory manner.

The first part—encouraging better trained young men to come into the industry—I think is obvious. One of the best ways to accomplish the second part—to give further training to the supervisors we now have—is through weekly meetings with all management groups regardless of how large or how small the operation. In our organization, we try to make every employee in a supervisory capacity realize that he is a part of management, and the only way we can possibly do this is to keep him advised of our performance, our plans, and our objectives, and give him further training where needed.

When we speak of supervision, we include all those whose work requires that they have the authority to hire or fire, or its equivalent.

Separate meetings are held for the superintendents, general foremen and foremen. In these meetings many, many subjects are discussed. They are too numerous to include them all, but I would like to point out just three or four of them.

Hold Weekly Meetings

Inasmuch as our plants are quite large, many of our supervisors are not too familiar with the operation of other parts of the plant. Various departmental heads are requested to prepare and lead a discussion in our regular weekly meetings on all phases of the operation of their department. This is not only beneficial to the group but to the leader, since in preparing his discussion many times he observes things which he did not realize were happening.

A course in motion study is given periodically to keep the foremen trained in the basic concept of motion time study. In this program we are not particularly trying to make finished analysts, but to acquaint the foreman with the fundamentals so that he will be more willing to accept the new methods and standards when they are presented to him.

When a new union contract is to be negotiated, all members of these groups are canvassed and requested to fill in a questionnaire suggesting changes in the contract that will make it better. These suggested changes are then discussed in the meetings, and the ones which seem to have merit are given to the negotiators, and although we don't have much success in getting them accepted by the union, nevertheless we do have some points on which to bargain. When a new contract is completed, any changes from the previous contract are discussed in detail and the intent behind each paragraph analyzed and reviewed.

(*Continued on page* 186)

New School Foundry Turned Over to City

CEREMONIES at Muskegon, Mich., on Feb. 15 marked the formal acceptance by that city's Board of Education of the new foundry at its Hackley Manual Training School — a foundry equipped through activities of foundry, equipment and supply companies of the Muskegon area. A detailed description of the new foundry was presented in THE FOUNDRY, March, p. 81.

Formal transfer of the new facilities from its donors featured a dinner meeting attended by about 50 leaders in the foundry and other industries and education. During the afternoon visitors inspected the foundry and witnessed the pouring of a special medallion designed at the instance of the Donors Committee to memorialize the event.

At right is shown one of the souvenir copies of the medallion poured by the foundry class. The bas-relief is of Charles H. Hackley, Muskegon public benefactor, who established the manual training school there in 1896. Below is shown George W. Cannon, chairman, Campbell, Wyant & Cannon Foundry Co., and chairman of the Donors Committee, pouring off a heat. Shown in the front row, left to right, are Dr. Ralph Wenrich, head of the state board for control of vocational education; C. W. Bemer, superintendent of Muskegon schools and H. L. DeVette, mayor of Muskegon.

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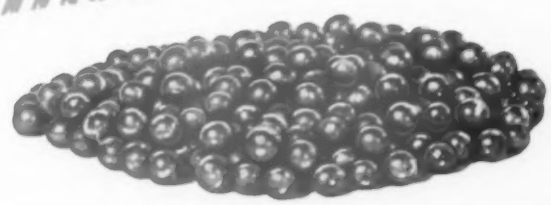

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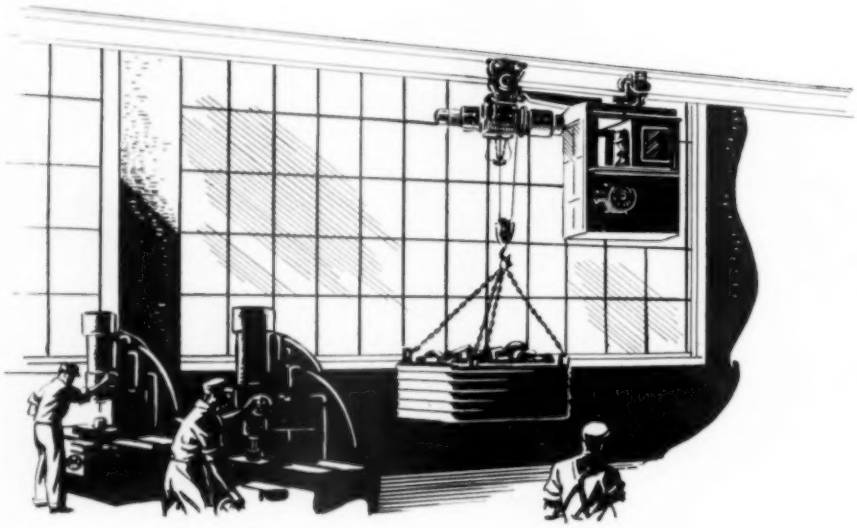

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(*Continued from page* 184)

It is universally agreed that high production, good housekeeping, and safety are closely related, and a great deal of time is spent on these subjects.

These meetings are not conducted by junior executives, but by the top management in each of our plants. I am sure that if this were not so, the effectiveness of the meetings would soon be lost. The meetings are well prepared and carried out according to plan, and are not allowed to degenerate into a bull session. A program of this kind is the best way that we have found to improve the effectiveness of our supervisory organizations.

Attract Young Engineers

In discussing my third thought—to attract young engineers into the industry to speed up the development of the many projects we should be working at vigorously to keep abreast of competing industries—I would like to think back over the last 28 years since I made my first connection with the foundry industry, and name some of the important developments I have seen put into operation during that time at our Saginaw Malleable Iron Plant. In the melting department these include:

1. Cupola electric duplex operation for the continuous melting of iron.
2. Cupola hot blast for improved operation of the cupola.
3. Humidity control in the cupola to enable us to have better control of our melting throughout the year.
4. Use of covered and insulated ladles which enables us to pour iron at more uniform temperatures and which has greatly improved working conditions.

In the core room, I have seen these developments:

1. Use of automatic sand driers so that we are able to start off with a uniform sand in making all cores.
2. Development of many techniques in the blowing of cores.
3. Use of continuous baking ovens of the recirculating type.

In the molding department, these developments:

1. Continous molding.
2. Use of automatic jolt and squeeze controls.
3. Double matchplate molding.
4. Composite molding — that is, making several different kinds of castings in the same mold.
5. Development of high-speed mold handling devices to relieve fatigue.
6. Use of synthetic molding sands and the elimination of facing.

(*Continued on page* 188)

Continuous Grinding . . . when Time is THE Factor!

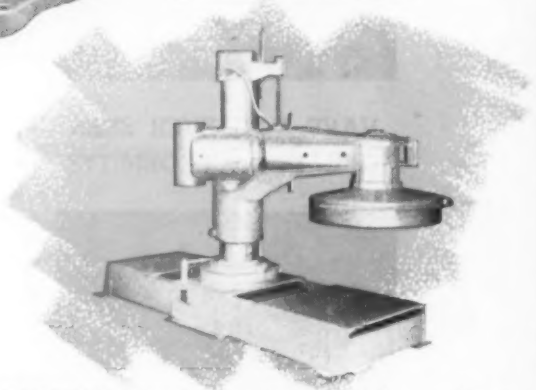
MILWAUKEE CORE GRINDERS Give You *Accurate* Cores, *Faster!*

When you're really hurried to finish that grinding job you can depend on MILWAUKEE CORE GRINDERS to come through for you. They grind cores down to extreme accuracy to maintain uniform metal thickness . . . and they grind away without interruption. No "downtime"! Maintenance is reduced to a minimum. Milwaukee Core Grinders continue in operation producing high-quality cores with very little attention from the operator. They do a better grinding job, faster, at lower cost.

MILWAUKEE Rotary Type Core Grinder — Grinds at 3 separate speeds, handling cores up to 72" in diameter. Wheel arm locks for continuous grinding of small cores or oscillates over entire table for large cores. Versatile operation and smooth grinding performance.

Pay for a Milwaukee Grinder While You GRIND Out PROFITS!

There is no need to operate old, obsolete or makeshift grinders in your core room. Install modern Milwaukee Core Grinders. They are self-liquidating. As you grind quality cores, you "grind out" extra profits . . . profits that pay for the Core Grinders while they work for you. Write today for complete details of Milwaukee's liberal "PAY-FROM-PROFIT" Plan.



MILWAUKEE Dual Type Core Grinder — Handles wide range of intricate and cumbersome cores. Effective cutting diameter 38". This grinder's adjustable wheel arm swings progressively around a 360° circle to accommodate cores at two grinding stations. The wheel arm locks for continuous grinding.

CORE BLOWERS • CORE GRINDERS • MOLDING MACHINES • BRIQUETTING PRESSES

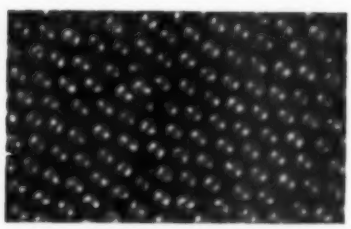
MILWAUKEE Foundry Equipment Co.

3236 W. PIERCE STREET, MILWAUKEE 4, WISCONSIN, U.S.A.

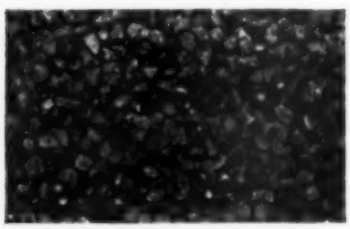
Pay!

A man's ability to make money for his employer determines his take-home pay.

THE SAME APPLIES TO BLAST CLEANING ABRASIVES



HAVE YOU EVER SEEN GREATER UNIFORMITY?



An abrasive that does a faster and better job of blast cleaning is worth more to a foundry and is definitely cheaper in the long run. Try—

20th Century Blast

SHOT . . . . GRIT

An unusual cleaning abrasive. Materials are chosen by blast cleaning experts and tempered by our exclusive heat treating process. Important developments in screening operations assure greatest uniformity in screen sizes.

IMMEDIATE SHIPMENT

THE CLEVELAND METAL ABRASIVE CO.

Main Office and Plant: 880 East 67th Street, Cleveland 8, Ohio

Howell Works—Howell, Michigan

(*Continued from page* 186)

In the heat treating of castings, we have seen these developments:

1. First tunnel type kilns installed back around 1920.

2. First radiant tube atmosphere controlled kilns which came into use around 1936.

3. Use of cover type radiant tube annealers for the annealing of large castings. Use of these new type annealers has reduced annealing cycles from about 240 hours to 31 hours.

And surely I should mention the improved working conditions in the foundries during that period. Certainly the entire industry has progressed during these 28 years.

A few weeks ago, I called a meeting of the departmental superintendents of our Saginaw Plant and asked them to spend some time thinking about processes already being used on a limited basis which require further development, and other projects which will probably be developed and put into use in the next few years in the industry.

At a later meeting on the subject, here are some of the more important projects which they thought most likely to be developed:

1. Introduction of pure oxygen into cupolas to speed up melting—making it possible to produce good castings with inferior grades of coke, make hotter iron, and maintain a smoother operating cupola.

2. Ultrasonic equipment to eliminate dust and smoke from cupola operations.

3. Improved methods of sand reclamation.

4. Pressurized melting. In this process the cupola is sealed to prevent the escape of hot gas. This builds up pressure in the cupola which results in faster melting and less fuel consumption. (The principle has been used by two blast furnaces successfully.)

5. Chemical treatment of coke to reduce ash content.

6. More rapid methods of obtaining analysis to facilitate closer control of product.

7. Better refractories to increase length of time of cupola operation.

8. Preformed ladle linings of plastic material. (DuPont now has one for nonferrous alloys.)

9. Introduction of new alloying agents which will enable the industry to produce lighter and better machining castings with better physical properties.

10. Development of plastic patterns where duplication would be a frac-

(*Continued on page* 190)

FOR ENDURANCE AND LONG LIFE BUY SPO MOLDING MACHINES

Get Speed AND Dependability...

with SPO MOLDING MACHINES

1 Flask in position ready for sand and jolt operation.
2 Bottom board and mold clamped.
3 Mold rolled over ready for draw operation.

Especially No. 9000 Series Jolt-Squeeze-Clamp Roll-Over Draw Machines!

The only speed that counts is speed with dependable operation. SPO molding machines give you both. "SPO" means simplicity of design and easy operation with all the accuracy that is essential to the making of good castings. With every SPO molding machine you get in addition our exclusive inverted jolt feature. This all-important development contributes greatly to attaining and retaining SPO speed and dependability . . . Always find out first what SPO has to offer.

MEMBER

Ask for our No. 9000 Series Catalog.

SPO INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND 5, OHIO

Prompt shipment—unlimited quantities now available to foundries from BAROID—the world's largest producer of Bentonite. Our modern plants are geared to fulfill every requirement of the foundry trade.

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Philadelphia, Pennsylvania

Robbins & Bohr
Chattanooga, Tennessee

Smith-Sharpe Company
Minneapolis, Minnesota

Southwest Foundry Supply Co.
Houston, Texas

Mr. B. J. Steelman
Chicago, Illinois

Stoller Chemical Co.
Akron, Ohio

Wehenn Abrasive Co.
Chicago, Illinois

Mr. Walter A. Zeis
Webster Groves, Missouri

BAROID
SALES DIVISION
NATIONAL LEAD COMPANY

BENTONITE SALES OFFICE:
RAILWAY EXCHANGE BLDG.
CHICAGO 4 • ILLINOIS

(*Continued from page* 188)

tion of the cost of present patterns.

11. Further development of the techniques of precision casting, using wax patterns. Castings are already being cast within .002-in.

12. New heat-resistant alloys probably will make it possible to use permanent molding on an expanded basis economically.

13. Improved molding methods, a greater use of automatic molding, pouring and shakeout.

14. Dielectric core baking will probably be in common use in a few years, insuring uniform and fast baking. (Medium sized cores are now being baked in 3 minutes.)

15. The use of thermosetting plastic for core driers and core plates, thereby reducing weight and heat loss.

16. Casting inspection for porosity and cracks by the use of ultrasonic equipment.

17. Cleaning of castings by electrochemical action.

18. High-frequency annealing which would reduce warpage of castings and give a closer temperature control, thereby eliminating straightening.

19. And the last item, but certainly one of the most important, a continuing program to make the foundry a better place to work by: Improved building design, better material handling methods, the greater use of air conditioning, improved safety programs, and better employee facilities —to mention only a few.

I would prefer not to make a guess as to how long it will take to develop these projects, but I am sure it will take quite a long time because we do not have enough trained engineers in the industry to carry on the work as fast as many of us would like.

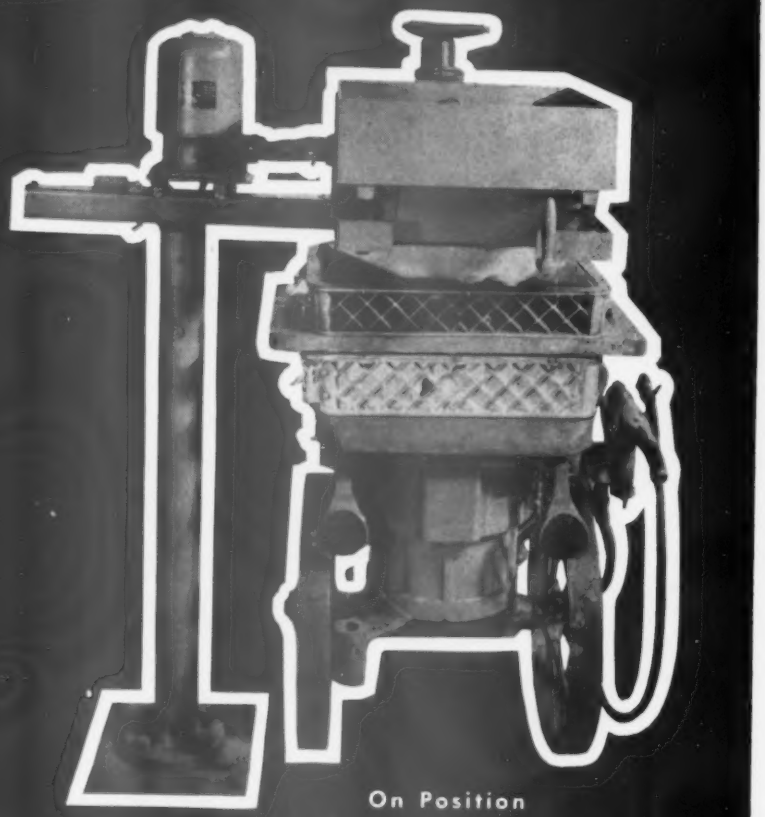
So it is quite obvious that it is necessary to encourage engineering schools to graduate more foundry engineers, and this can only be accomplished by the foundry industry giving the schools support from every angle.

We are now facing a highly competitive situation in the industry. Anyone who has talked to foundry operators recently realizes that backlogs are off at least 50 per cent. So it behooves all of us to give these matters due consideration to see what can be done to help the situation, and here are three things which I think are a "must" in everyone's program:

1. Improve the personnel of our organization at all levels by concentrating on better training programs within our own plants and

(*Continued on page* 192)

Here's the Answer to the Riddle



Model illustrated single channel **$365**

Standard double **$385**

Roller Riddle Corporation has developed the machine illustrated in an effort to find an answer to what has been a back-breaking foundry operation for years. This is it. It is a proven machine operating without mechanical failure in an outstanding foundry for over 3,000 hours.

☆ In a matter of seconds sand is riddled onto the entire surface of the pattern plate easily and evenly. A special designed ¼ h.p. motor, combined with a limit switch, automatically activates the riddle basket oscillating 900 times per minute.

A 65 lb. sand capacity and a 31″ travel of the riddle on the channel make the machines highly flexible. Sealed roller bearings throughout—no lubrication necessary. Shaft, tube rubber cased, keeps motor free of sand or dirt.

Write today for new catalog.

ROLLER RIDDLE CORP.

POST OFFICE BOX 178
PORT HURON, MICHIGAN

Spencer Foundry Turbo

SPENCER FOUNDRY PROTECTION

for Men, Melts and the Pours

Spencer Turbos are the accepted standard for foundry cupolas because they provide maximum reliability of the air supply over long continuous service. Constant volume or weight of air can be maintained by hand or automatic control whichever is preferred.

High dust counts and shut-downs must be kept to a minimum in the modern foundry.

Spencer Vacuum Cleaners, stationary or portable, remove overhead dirt, clean patterns, molds and castings, and reclaim foundry sand. It helps keep the dust count down.

Both machines are of the centrifugal type with wide clearances, light weight impellers, low peripheral speeds, and only two bearings.

The result, a quiet running machine which requires no special foundations. For reliability, we can refer you to Spencers that have been in service 25 to 40 years.

ASK FOR THESE SPENCER BULLETINS

No. 131	General Information
No. 116	Piping and Valves
No. 137	Boiler Cleaning
No. 102	Portable Vacuum Cleaners
No. 125	Central Vacuum Cleaners
No. 130	Sump Tank Cleaner
No. 143	Pneumatic Conveying
No. 142	Turbo-Agitation
No. 127	Turbo-Compressors
No. 109	Gas Boosters
No. 112	Foundry Blowers

Cleaning molds with Spencer Vacuum

332-D

SPENCER HARTFORD

THE SPENCER TURBINE CO.
HARTFORD 6, CONN.

(*Continued from page* 190)

seeing to it that the people who are hired for replacements are of high caliber.

2. To encourage the re-investment of a part of profits into better equipment which will tend to produce a better product at a lower cost, and

3. To concentrate the efforts of our entire organization on cost saving methods.

Turning now to what the foundry industry is doing to promote educational programs, this subject can best be covered by outlining what the Foundry Educational Foundation and the American Foundrymen's Society are doing, because so far as I know they are the only organizations which have a program covering the industry as a whole.

The FEF is fortunate in having for its officers and board of trustees some of the most outstanding men in the foundry industry. They are all serving without compensation of any kind and paying all of their own expenses because of their deep interest in this program.

Firms Contributed Generously

Through the efforts of foundrymen all over the United States, in excess of $300,000 has been raised to carry on the work of the foundation for the first three years. The money is being used for scholarships, the purchase of equipment, and the hiring of instructors where necessary. At present, 92 scholarships have been assigned in the six schools co-operating with the FEF, and a great many other students who have not been awarded scholarships are taking the courses because of their availability.

The three main objectives of the foundation are:

1. To encourage engineers to enter the foundry industry for their careers.

2. To promote the welfare of the foundry industry among the engineers of the future.

3. To provide instructors for high schools, trade schools and universities.

The AFS is promoting apprentice training and apprentice contests; is assisting the chapters through the issuance of material to guide them in their local educational programs; is promoting the formation of additional university student chapters; and is sponsoring technical sessions at the national convention specifically relating to education. It is having a college level text book written by Prof. P. E. Kyle of Cornell University, and a high school level text book being prepared by Dewey F. Barch of Kent

(*Concluded on page* 194)

NOW! A REALLY MODERN WIRE BRUSH...WITH BRISTLES LOCKED IN RUBBER

NO METAL FLANGES TO MAR SURFACES
NO RIGID HINGE POINT TO BEND OR BREAK WIRES
ALL-RUBBER CORE ABSORBS VIBRATION
WIRES COMPLETELY LOCKED IN RUBBER
RUBBERLOKT

Due to a new process for imbedding wire in rubber, you can now buy a more efficient kind of rotary wire brush.

It's the HEWITT **RUBBERLOKT** ROTARY WIRE BRUSH . . . with bristles that are *locked in rubber!*

Here are some of the many reasons why you'll say it's a better brush in every way!

Less Vibration—Its special rubber mounting soaks up vibration. So your workers will find it easier . . . and less fatiguing . . . to use on both portable and bench tools.

Easier on Tool Bearings—Less vibration means greater protection for tool bearings and arbor shafts. It means you have less maintenance on those tools, too.

More Brushing Points—Exclusive Hewitt rubber flange keeps bristles in an upright position all during the life of the brush. That provides more brushing points . . . gives you a smoother job.

Better Flare Control—Special rubber flange always brings the wires back to their upright position . . . won't let them bend out or mat down. *Gives brush longer usable life!*

Less Wire Breakage—Rubber mounting reduces bristle ejection. And it also eliminates the rigid hinge point that causes wires to fray and break. Result—*you get a much safer brush!*

Faster, Better Work—Unlike a rigid metal mounting, the Hewitt flexible rubber-locked mounting allows the wires to "give" without bending or breaking. Yet it holds them together compactly under working pressure. So it allows your workers to do a faster, better job . . . even on irregular surfaces.

Investigate the Hewitt **RUBBERLOKT** Wire Brush today. Write Hewitt Rubber Division, Dept. F-4, 240 Kensington Ave., Buffalo 5, N. Y.

Distributors! Your inquiries invited. Some sales territories still available.

HEWITT
RUBBERLOKT
Rotary Wire Brush
Patent Pending

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Combs Famous "V-5" MODEL with 36" screen

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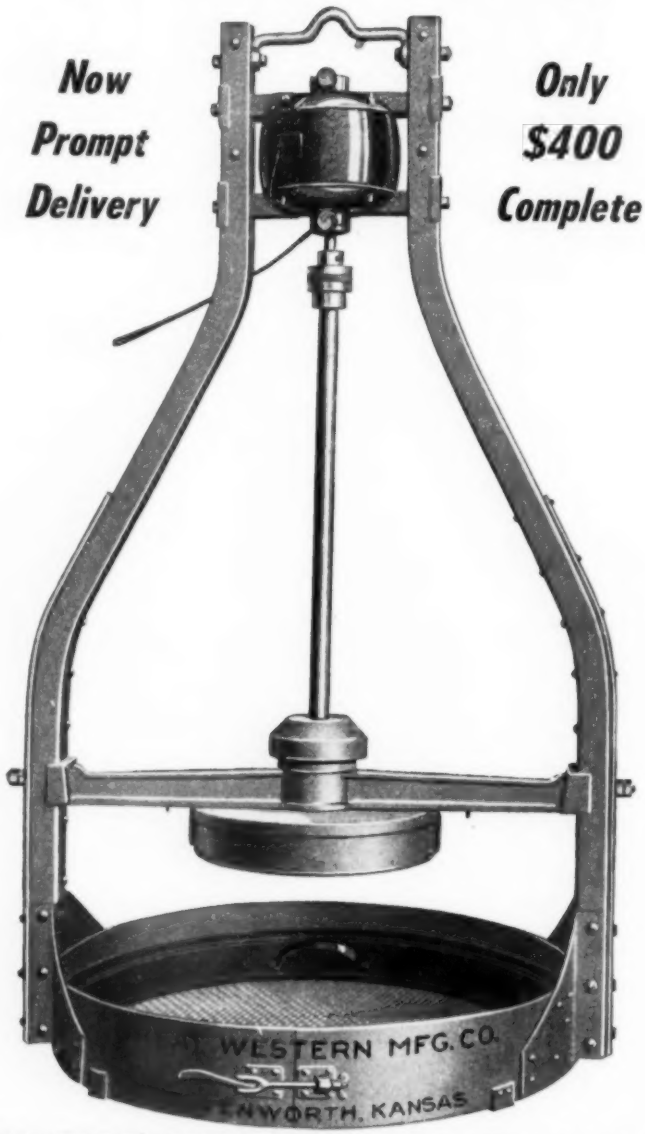
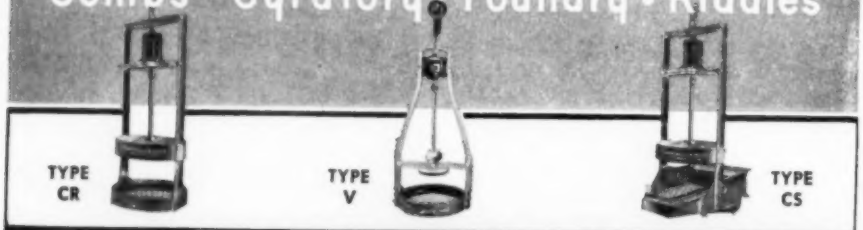
Now Prompt Delivery

Only $400 Complete



ORDER FROM YOUR FOUNDRY SUPPLY HOUSE

Combs • Gyratory • Foundry • Riddles



GREAT WESTERN MANUFACTURING CO.
LEAVENWORTH, KANSAS, U.S.A.

(*Concluded from page* 192)

State University.

The activities of these two organizations and the work that the various chapters of the AFS are doing pretty well covers what the industry is doing to promote educational programs.

The last subject I would like to discuss is—What can we as individuals or as a group do to help accelerate the programs? I think this can be accomplished by:

1. Encouraging the high school and vocational schools to give greater attention to foundry sequences, particularly in areas where there is a large concentration of foundry employees.

2. Sponsor more night or extension courses for people already in the industry so that they may improve themselves.

3. Promote chapter-university, regional joint conferences and training programs for members of the industry.

4. Encourage young men to enter the Foundry Educational Foundation program.

5. Sponsor more plant visitations by educators and students in their junior and senior years in high schools or vocational schools.

In the many years which I have been connected with the industry, I have become very attached to it. I have reached a position in management where I am responsible for the progress and welfare of a great many people, and I think that responsibility carries with it the obligation that I do whatever I am capable of doing to improve their position. Quite obviously, little progress can be made by any individual in an industry that is not making progress, nor can an industry which is unprofitable pay the people in it the rewards that many of us would like to receive.

Fortunately for us, the foundry industry is still a profitable one. Let's all of us try to keep it that way by making an intelligent, realistic approach to our problems so that we are sure that we will make progress.

Moves Office

Chain Belt Co., Milwaukee, has moved its Los Angeles district office and warehouse to new and larger quarters at 3838 Santa Fe Ave. Newly installed facilities for machining of sprockets, shafting, shaft couplings and other power transmission items now supplement warehouse stocks. J. V. MacDonald, Los Angeles district manager, will continue in charge of the new warehouse and office.

FOUNDRY Statistics

Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1947	1948
Jan.	466.9	380.9
Feb.	472.5	367.3
Mar.	532.3	326.2
Apr.	445.9	412.0
May	525.9	388.5
June	658.9	376.8
July	426.1	456.3
Aug.	411.3	324.7
Sept.	393.1	273.5
Oct.	438.2	296.0
Nov.	286.1	284.4
Dec.	467.8	243.7

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Foundry Production Workers

ESTIMATED NUMBER:

Type Foundry	Nov. 1948	Oct. 1948	Nov. 1947
Gray Iron	115,200	115,600	118,900
Malleable Iron	38,600	38,500	36,700
Steel	75,100	75,000	69,900

AVERAGE WEEKLY EARNINGS:

Gray Iron	$58.75	$59.73	$55.51
Malleable Iron	60.71	61.58	58.06
Steel	63.92	63.36	58.73

AVERAGE WEEKLY HOURS:

Gray Iron	38.8	40.4	40.9
Malleable Iron	39.9	40.6	41.2
Steel	41.3	41.0	41.0

Source: Bureau of Labor Statistics. Estimates number of foundry production workers adjusted to Federal Security Agency data through 1945.

Castings Production

In Philadelphia Federal Reserve District

(January, 1949)

Type	Percentage Change From Dec., 1948	Jan., 1948
Gray Iron	— 7.0	— 6.8
Malleable Iron	—18.8	+18.5
Steel	— 7.2	+ 9.8
Nonferrous	—22.3	—15.7

Source: University of Pennsylvania.

Shipments of Castings

(Reported by Bureau of the Census)

Gray Iron Castings

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Aug.	951,859	550,961	2,631,273
Sept.	1,025,089	590,702	2,679,858
Oct.	1,154,192	654,426	2,668,781
Nov.	1,020,239	561,660	2,687,244
Dec.	1,066,211	587,933	2,782,236
Total	12,540,960	7,181,299	.....
1948			
Jan.	1,064,335	584,238	2,802,685
Feb.	1,024,450	571,406	2,769,408
Mar.	1,169,085	659,821	2,726,415
Apr.	1,051,083	584,969	2,690,893
May	992,692	555,728	2,601,626
June	1,072,040	597,624	2,587,081
July	914,464	490,359	2,601,084
Aug.	1,050,948	597,678	2,598,789
Sept.	1,088,051	615,978	2,587,385
Oct.	1,148,422	642,485	2,522,831
Nov.	1,099,827	606,380	2,406,737
Dec.	1,110,512	624,739	2,284,348
Total	12,785,909	7,131,405	.....

Steel Castings

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Aug.	120,405	88,719	478,649
Sept.	137,457	102,913	526,229
Oct.	148,358	111,288	497,344
Nov.	130,125	97,143	493,309
Dec.	148,124	110,970	489,364
Total	1,625,055	1,203,504	.....
1948			
Jan.	141,068	108,282	491,745
Feb.	142,434	107,762	497,097
Mar.	162,891	125,550	508,822
Apr.	150,305	114,896	472,370
May	143,337	111,616	482,531
June	152,894	117,794	469,973
July	120,445	87,927	497,410
Aug.	140,223	107,538	472,481
Sept.	149,222	112,551	447,972
Oct.	152,983	114,819	424,460
Nov.	146,835	110,275	395,013
Dec.	157,395	116,285	354,458
Total	1,760,032	1,335,295	.....

Malleable Iron Castings

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Aug.	62,404	38,165	229,735
Sept.	71,568	40,138	218,276
Oct.	83,979	47,673	210,695
Nov.	72,111	39,969	206,510
Dec.	77,757	44,042	202,408
Total	895,054	513,228	.....
1948			
Jan.	77,744	45,808	205,759
Feb.	75,194	42,582	209,447
Mar.	86,767	50,017	203,351
Apr.	80,602	45,941	199,578
May	76,079	42,261	191,553
June	81,747	48,113	178,760
July	64,995	34,940	180,421
Aug.	73,273	41,088	176,824
Sept.	77,824	43,881	164,002
Oct.	81,761	44,305	158,351
Nov.	77,234	42,241	146,422
Dec.	79,871	43,386	137,485
Total	933,091	524,563	.....

Aluminum Castings

(Thousands of pounds)

	Shipments Total	Shipments Sand	Shipments Perm. Mold	Unfilled *Orders
1947				
Aug.	30,441	10,908	11,342	94,658
Sept.	35,877	12,228	14,146	94,637
Oct.	40,532	13,855	15,685	85,012
Nov.	34,683	11,428	13,558	83,975
Dec.	37,489	12,552	13,784	81,784
Total	441,996	155,112	174,515	.....
1948				
Jan.	37,889	12,670	15,020	86,176
Feb.	37,963	12,177	15,055	88,032
Mar.	41,794	13,343	16,258	78,344
Apr.	38,269	12,407	14,563	78,499
May	33,868	11,854	12,351	75,219
June	35,822	12,296	13,239	72,930
July	28,944	9,851	10,504	70,321
Aug.	32,136	9,883	13,174	68,334
Sept.	35,877	11,822	13,353	66,773
Oct.	35,542	11,733	13,216	65,538
Nov.	34,550	11,410	13,012	63,767
Dec.	31,836	10,335	11,589	59,154
Total	424,490	139,781	161,334	.....

Copper-base Alloy Castings

(Thousands of pounds)

	Shipments Total	Shipments Sand	Shipments Perm. Mold	Unfilled *Orders
1947				
Aug.	75,060	68,271	4,021	68,659
Sept.	83,158	75,728	3,976	69,919
Oct.	92,119	83,592	4,763	67,280
Nov.	81,803	74,274	3,773	73,851
Dec.	87,215	79,495	4,393	74,814
Total	1,051,742	960,732	51,139	.....
1948				
Jan.	85,432	77,433	4,593	74,579
Feb.	87,169	79,329	4,509	71,143
Mar.	96,344	87,249	5,261	70,544
Apr.	89,035	80,426	4,705	70,726
May	81,286	72,982	4,910	65,818
June	84,817	76,241	5,148	64,149
July	71,803	64,389	4,670	66,014
Aug.	81,976	73,947	5,018	69,126
Sept.	86,973	78,830	4,999	66,574
Oct.	91,311	82,463	5,293	62,571
Nov.	86,497	77,751	5,107	60,892
Dec.	88,182	79,750	4,796	53,671
Total	1,030,825	930,790	59,009	.....

Magnesium Castings

(Thousands of pounds)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1947			
Aug.	523	486	3,267
Sept.	518	467	2,747
Oct.	616	560	2,659
Nov.	602	545	2,808
Dec.	669	587	2,730
Total	7,693	7,050	....
1948			
Jan.	659	597	2,701
Feb.	655	591	2,866
Mar.	704	625	2,741
Apr.	673	605	2,640
May	622	542	2,673
June	709	624	2,712
July	554	521	2,684
Aug.	703	655	2,834
Sept.	745	700	3,206
Oct.	708	650	3,070
Nov.	728	683	3,416
Dec.	754	695	3,455
Total	8,214	7,488	....

* For sale only.

THE ADVENTURES OF Bill

By PAT DWYER

Drawings by RICHEY

IF YOUR innocent little son," Bill said, "were to ask you 'Pa-pah, what is a Dobbie?' you can answer quite truthfully and without any feeling of inferiority complex, that you do not know. You can go a step farther, and boldly state that no person knows. Later in life you are amazed and deeply chagrined to learn that the word is in common use among the diligent toilers and moilers in plants where looms are built. Also in textile plants where looms are used and where thread is converted into cloth. If you care to go a little deeper into the subject, by riffling through the pages until you come to the D's, Mr. Webster has the word in his collection. He mentions two other meanings and then under heading 3 he says 'An apparatus resembling a Jacquard for weaving small figures. Usually about 12-16 threads. Seldom more than 36-40 threads.'

"I had advanced thus far in the field of general knowledge when I had an inquiry from a gentleman in the Far East. The letter bore a few marks which indicated that English, although very good, was not the mother tongue of the writer. On the whole it was a very creditable performance. A reflection on what a sorry figure I should cut, if I attempted to reply in the spidery characters of his native language, knocked my vanity rating practically out the window."

"Why should you have any ambition to write the citizen in his own language, especially about a subject of which you knew absolutely nothing? Seems to me in a case of that kind the appropriate answer would be that you were a total stranger to Dobbie Jacks. You did not know if it was animal, vegetable or mineral. Dash it all man, a person is not supposed to know everything. A better answer would be to throw the inquiry in the waste paper basket and forget all about it."

"Well," Bill said, "that particular temptation did raise its ugly head a few times, but I am pleased to report that I resisted in a manner that should earn me a star in my crown, even if it is only a little one. I am no relation to the fella who said he could resist anything except temptation. At one time or another in a long and variegated career I thought I had heard every term used in the foundry. Rather humiliating to find a term apparently so well known it had penetrated to the Far East, but never had come within the scope of my general foundry knowledge.

A vague suspicion, probably prompted by my inquirer's letterhead, suggested that a Dobbie Jack was connected in some way with the complicated machinery employed in weaving cloth. I wrote an old friend, superintendent of a foundry where textile machinery is made. Short, sharp and to the point, in hearty man-to-man fashion I had written: 'Joe, me boy, what are Dobbie Jacks and how are they made?' Joe is not his name, just as you suspected, but it will serve. Joe very obligingly sent my inquiry on to a friend who actually makes the things. In part this foundryman wrote as follows:

'Referring to our conversation regarding Dobby Jacks, we are enclosing a Crompton & Knowles booklet on dobbies and multipliers, also a descriptive list and a print of No. 6 and No. 7 C & K Dobby. The Dobby Jacks shown on the accompanying illustration are the usual type furnished with modern dobbies. The dobby is used on weaves which require more than 6 harnesses. Control is through a series of chain bars and pegs.

'Manufacture of the Dobby Jack usually is done on a steel plate job in the foundry. To keep our scrap at one plant where I worked, we stopped production on dobby jacks if our regular molder did not show up for work. Before taking this precaution, we had thrown away many day's work by substitute molders.

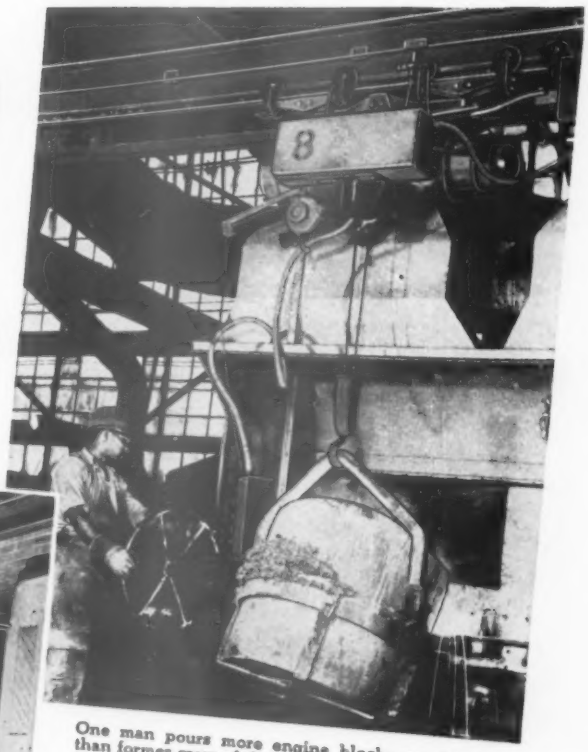
'In the snagging room we gaged the unfinished pieces with snap gages. Tolerance in the unfinished piece was 0.005-in. Tolerance on the surfaces which acted as guides was achieved on a Gardner grinder to a snap gage limit of plus or minus 0.002-in. If the castings were thick, we would have trouble in the assembly department.

'The Crompton & Knowles Loom Works, Worcester, Mass., builds a complete line of dobbies, accepted

(*Continued on page* 198)

Polite and courteous request of party on the left fails to arouse spontaneous enthusiasm. Remarks censored

HEAVY LOADS GO "Up and Over" with finger tip control



One man pours more engine blocks per hour than former crew of three.

Two ton loads of steel pass off crane bridge to spur track over dock.

American MonoTractors do the hard jobs the easy way. They perform automatic "Up and Over"* handling operations with extreme accuracy and reliability. Finger-tip control assures accurate movement and spotting of the load. "Up and Over" machinery and equipment means no damage to machines or materials and no congestion in the operating area. More important, they eliminate back-breaking labor. The hazard of bad strains and hernia is gone.

In short, American MonoRail Overhead Handling Equipment increases production, saves labor, saves time and cuts costs. American MonoRail engineers will gladly show you that automatic handling pays and saves.

Heavy wheel assemblies handled between machines by finger-tip control.

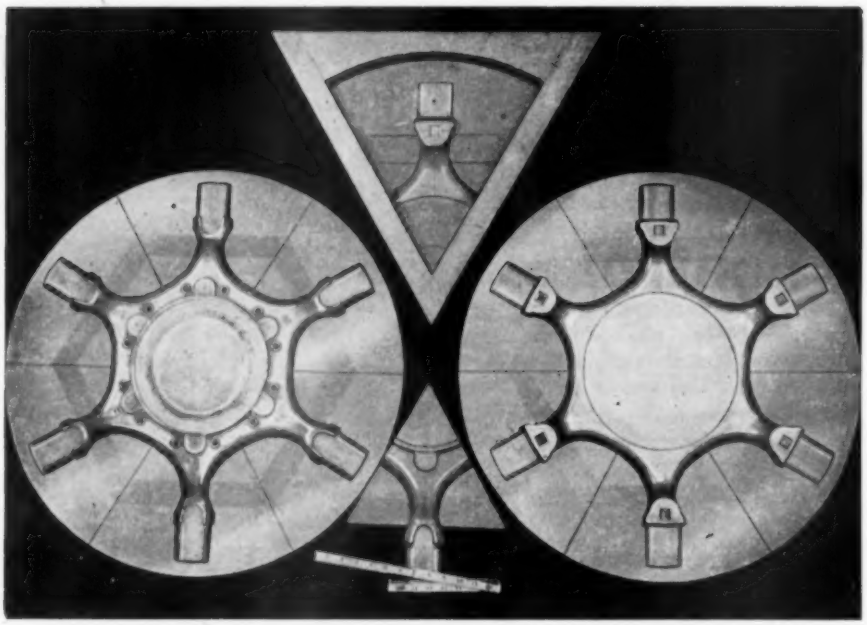
Free MOVIE

A twenty-minute 16 mm. sound film gladly loaned upon request.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE **CLEVELAND 7, OHIO**

PROFIT BY OUR MANY YEARS OF EXPERIENCE



Cope and drag equipment for truck wheel, made from one spoke (1/6) of wheel.

Get More Production and Cut Costs! Use Pressure Cast Matchplates and Cope and Drag Plates

Only one master pattern does it! From it we make you single or multiple pattern matchplates, casting them under pressure in plaster molds. Why not find out exactly how much we can save you by this method, or by furnishing cope and drag plates which likewise jump production and lower your costs? Write us for quotations now.

Matchplate made from master pattern

PLASTER PROCESS CASTINGS COMPANY

6922 Carnegie Ave. Cleveland 3, Ohio

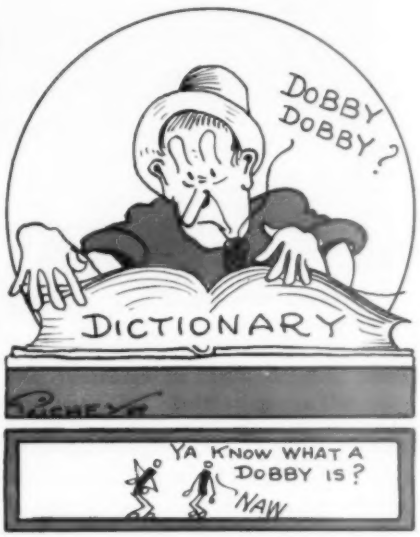
Affiliate—Toledo Matchplate Company 534 State St., Toledo 2, Ohio

Pressure-Cast MATCHPLATES COPE and DRAG PLATES

(*Continued from page* 196)

everywhere as the standard of excellence. To avoid confusion the different types are designated by numbers:

'Type 1—This dobby originally was designed and built by the Crompton Loom Works. It is identified by the letter *D* which precedes many of the casting numbers. Type 2—This dobby originally was built in Providence. Many of the castings on this dobby are preceded by the letter *F* (formerly known as *Knowles Type Dobby.*) Type 3 is the so-called overhead, or horizontal lever dobby, mostly used to produce limited figures on the face of elastic webs woven in narrow fabric looms. It is mounted on timbers over the loom, similar to the



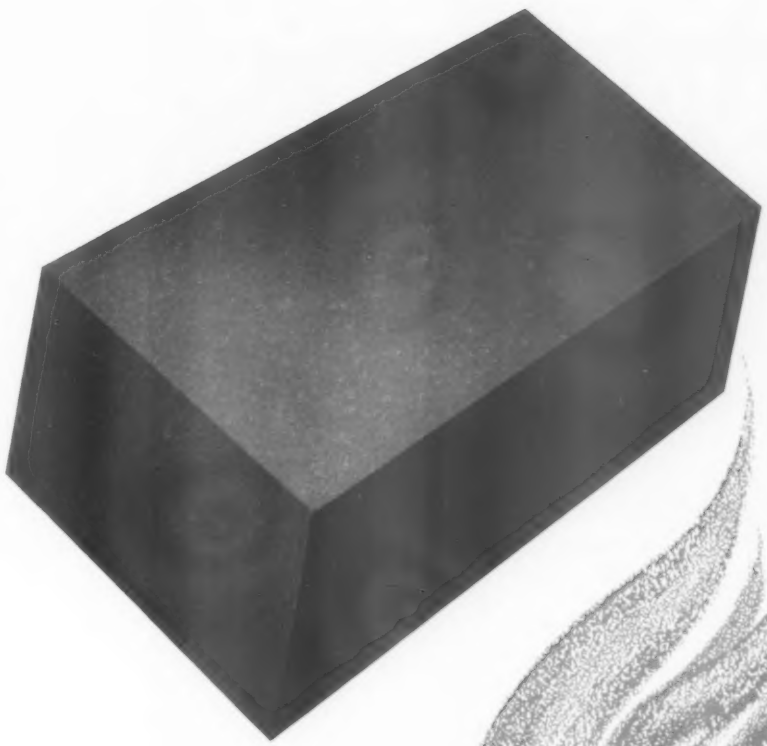
Double talk has old boy stopped

jacquard. The levers or jacks are in a horizontal position and a regular jacquard harness is attached to these levers, passing through compart boards and weighted by lingoes. There is another word for your collection. Have you any idea what a lingo is?

'Type 4 dobby was designed to use on narrow fabric looms. A large number of the working parts are interchangeable with the Type 2 dobby. The principal difference is that the frame on which the dobby is assembled is adapted for use on narrow fabric looms. Type 5—This is the dobby originally built at the Readville plant of the Stafford Loom Works. Type 6—Is the dobby built since 1929 for use on the super silk and Cotton King types of looms. Type 7—Is the type 6 dobby fitted with the latest improved jack backs and hooks.'

"The booklet," Bill continued, "has 54 pages of condensed information on the subject of dobbies, what they

(*Continued on page* 200)



MEXITE BRIQUETTES STABILIZE CARBON ANALYSIS . . . REDUCE SCRAP LOSSES

Casting losses due to low carbon content can be eliminated with MEXITE BRIQUETTES — specially processed and sized Mexican Graphite held by a fluxing bond. MEXITE BRIQUETTES are the most effective source of carbon to raise and stabilize the carbon content of molten metal, especially when high percentages of steel are charged. MEXITE BRIQUETTES cut casting losses caused by shrinkage, poor fluidity and brittleness, and improve machinability of finished castings. They are easy to use — a specified number of briquettes is added to each charge in accordance to formula. MEXITE BRIQUETTES improve quality, cut production costs. Write for full details.

Mexite Briquettes

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICH.
DIVISION OF THE WICKES CORPORATION

HAUSFELD FURNACES

FOR "ALL-OUT" PRODUCTION IN NON-FERROUS FOUNDRIES

Provide the Utmost in Speed Production and Safety

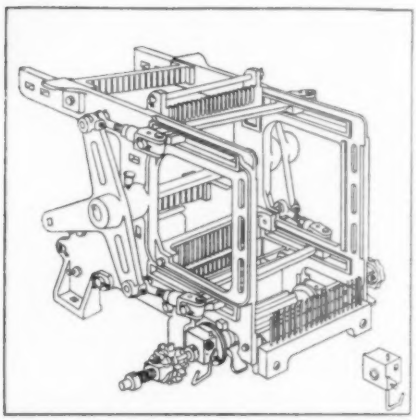
FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

(*Continued from page* 198)

are, what they are for and how they are fitted up and operated. The only thing missing is where and how the name originated. The feeling of superiority in the knowledge I have just handed you cannot be enjoyed to the full. It is so dashed difficult to inject a reference to dobbies into a casual conversation. For example, you observe brightly 'Very complex gadgets, these here now dobbies.' The man leaning on the bar to your right says 'So what?' The man leaning on the bar to your left rudely remarks 'So's yer ol' man,' The third man shouts 'Speak up man. What did you say?' The fourth man, ever anxious to contribute his share says 'That's what they call the cops over 'ome.' "

"Kind of far fetched," I observed.



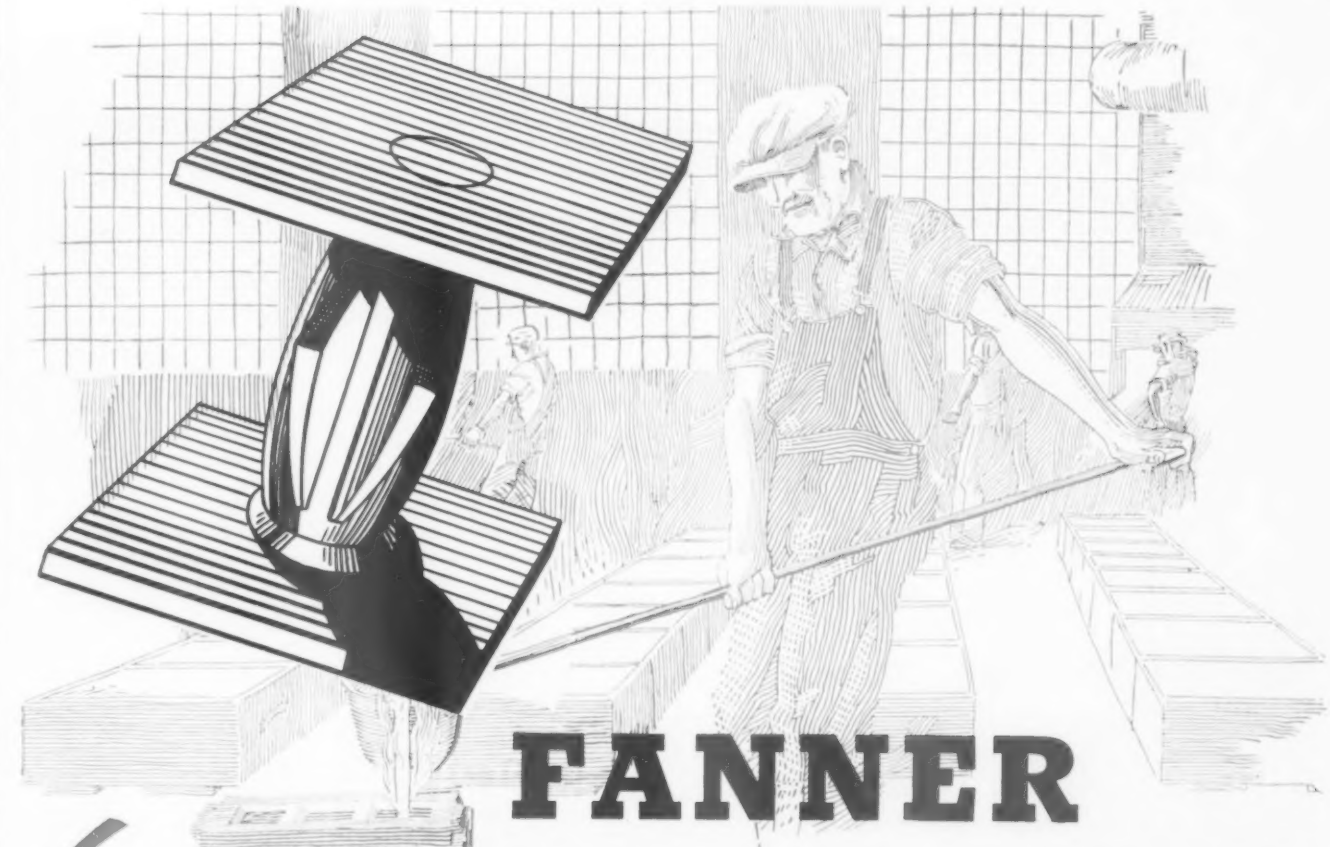
Dobbie Jack is a complicated weaving machine

"What else did the postman leave you last week?"

"Well," said Bill, "now that you mention it, I had rather a long letter from an elderly foundryman. He wanted information on how to break large pieces of scrap. Here, I'll read it to you:

'For some time I have been looking at the classified ads in The FOUNDRY. I am afraid I am looking for something that is not in existence, or if in existence, is not for sale. It should be in use in all foundries where a small cupola is in use, say 8 tons per hour or less. We have no end of trouble in breaking heavy scrap castings, flywheels, machine beds, etc. Trying to break heavy scrap with a hammer causes more men to quit their jobs than anything I know of around a gray iron foundry, especially in hot weather. Several years ago while visiting a shop in a neighboring town I saw a derrick rigged up in the yard. A man turning a crank on a drum, hoisted a large weight. At a predetermined height the catch

(*Continued on page* 203)



FANNER CHAPLETS and CHILLS

Because of the great variety of available Fanner Chaplets and Chills, more and more foundries are switching to Fanner, and saving money. Fanner's facilities for making precision Chaplets and Chills is unexcelled. Moreover Fanner offers as "standards" many Chaplets which are charged for by others as "specials". Send samples of your Chaplets and Chills to The Fanner Engineering Department to find out how you can make radical savings by switching to Fanner.

THE FANNER MFG. CO. • CLEVELAND 1, OHIO

In Canada: CANADIAN FANNER, LTD.
Hamilton, Ont., Canada

Birdseye view of the Fanner Brookside Park plant in Cleveland

OVER 100,000,000 IN STOCK

for continuous heavy-duty operation

O-CE COMPRESSORS

When the demand is for a continuous, economical supply of air, the CP motor-driven O-CE COMPRESSOR is unsurpassed.

Quick-acting Simplate valves minimize power consumption and provide high volumetric efficiency. Large, stream-lined air passages make air flow resistance negligible. CP Multi-Step Control handles partial load demands economically. CP Intercooler assures maximum heat transfer with low water consumption. CP Automatic Starting Unloader completely unloads compressor when starting and stopping.

The CP heavy-duty, conservatively rated Class O-CE Compressor is of the horizontal, double-acting, water-cooled type, with direct-mounted synchronous motor drive; in sizes up to 1,750 h.p., for pressures up to 5,000 pounds.

Write for full information.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

ELECTRIC TOOLS • PNEUMATIC TOOLS • AIR COMPRESSORS • ROCK DRILLS
DIESEL ENGINES • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

(*Continued from page* 200)

was released to allow the weight to fall on the piece of scrap and break it. This man could only place the casting in the center, or in position for the ball to drop on it. This was a very slow and expensive way to break heavy cast iron. At times the weight would glance off and had to be lifted and dropped several times.

'I would like to hear from some person who has a more satisfactory rig for breaking scrap. I should like to see a heavy steel block suspended from cables, or from trolley wheels traveling on rails the full length of the yard. The scrap casting could be placed in position where you know the drop positively will fall. A power hoist could be employed to run the weight up to where the catch would release the weight. In some instances a horse is employed to pull the weight up. To some extent the method is similar to the method and equipment for driving long spiles. A good rig of this kind would pay for itself the first year. In all modern pig iron plants the iron is run into open face metal molds, instead of the old time sand mold made in the furnace floor in front of the tap hole. The sows, or heavy pieces of iron from the main channel or runner, are very difficult and in the majority of cases, impossible to break with a sledge hammer. I have seen men pound on one lump of iron for half an hour and then pitch it in the pile of untouchables.

'As a result our yard has a large tonnage of iron. The accumulation has been growing for 15 years. It could not be broken for use in a 5-ton cupola. We might melt some by placing one or two in the last charge. This iron would be poured in the pig bed and afterward broken into suitable size for charging in the regular manner. Perhaps through your publication you might find a foundryman who knows of a good rig for breaking the scrap. Certainly I will try to get in touch with him. Certainly we can't go along in the present manner and keep stocking up at a dead loss, iron that should bring us a revenue instead of lying idle year after year out in the yard. Kindly place an ad in THE FOUNDRY to this effect.'

"In my reply I pointed out to this man that he was up against a problem that has troubled many foundrymen in the past, the present, and very likely will in the future. Practically every yard has one or more large pieces of scrap that defy all ordinary methods. In many in-

(*Continued on page* 206)

Modern Foundries
Don't Have
FUMES AND DUST

Available both as a floor-mounted type (shown) or an overhead installation. Complete with a motor-driven sludge removal conveyor, where required.

...they have
Schmieg
CENTRI MERGE

AUTOMATIC ELIMINATION
from Collection to Disposal

Operators of modern foundries have long since learned the economy of ridding their shops of destructive dust and smoke fumes. Men who work in foundries free of these health hazards feel better, work better, produce more. And the accident rate is lowered. In actual foundry operation, the Schmieg CENTRI-MERGE method of dust and fume elimination has shown marked advantages over any other system. Dust and fumes are collected *immediately they occur*—shot back on a stream of air through ducts to the Collection Unit. In the washing chamber of this unit—a veritable tornado of seething, churning water-dust is washed and scrubbed from the air and flooded into the sludge tank below, permanently trapped under water. Fumes go out the exhaust. AUTOMATIC operation from start to finish.

If you are interested in learning why the CENTRI-MERGE method is so highly endorsed by foundry owners and how its application can so greatly benefit your own operation, our engineers are prepared to give you some eye-opening information on dust and fume elimination—without obligation, of course.

THE *best* AIR PURGE is CENTRI MERGE

Schmieg INDUSTRIES INC.
Engineers & Manufacturers

302 PIQUETTE AVENUE • DETROIT 2, MICHIGAN

FEDERAL SUPPLIES

FEDERAL'S LOWE SIFTER

Save money by faster sifting, better sand conditioning with a Lowe Electric Sifter. Features: greater screening area, enclosed ball bearing motor, more shoveling room. Write for information. Prompt delivery.

CLIMAX WIRE STRAIGHTENERS

Any foundry, large or small, can cut production costs by straightening and reusing core wires and rods. With a Climax Wire Straightener this can be done quickly, economically, safely — by unskilled labor. A complete descriptive circular is yours for the asking.

The "Lightning" Clamp

The "Holdtite" Clamp

CLAMPS

Federal offers two types of flask clamps.

The "Lightning" clamp is an eccentric type, requiring no wedges and available in two sizes: No. 2, 8" to 12" and No. 3, 12" to 20".

The "Holdtite" is an adjustable clamp designed for use with wedges and is also offered in two sizes: No. 1, 13" to 23" and No. 0, 18" to 33".

Both clamps made of sturdy malleable iron, rigidly reinforced to prevent distortion.

FEDERAL'S WONDER CUTTERS

Two compact cutters for rods and band iron. One cuts up to ⅝" round and the other to ⅞" round. Readily mounted on any bench. Users say they're worth their weight in gold!

RUBBER-COVERED SHOVEL HANDLES

The best insurance you can buy against damaged patterns, core boxes or flasks. The pean-shaped grip is ideal for ramming.

They will fit your present shovels or you can order your next shovels with them already installed.

TWISTED STEM CHAPLETS

The chaplet with everything. The "Twisted Stem" promotes rapid complete fusion. Not deformed, the stem has no weak spot to burn in and permit core shift. Made in a complete range of sizes. Samples of the size you use, gladly submitted.

WATER BRUSH

Easy to Grip and Hard to Tip. It can't leak and one filling lasts all day. Does not tire the molder's hand.

BLAST CLEANING NOZZLES

Air consumption is reduced and the blast is concentrated because the hole in the nozzle wears very slowly. Made in all sizes and types. Write for circular.

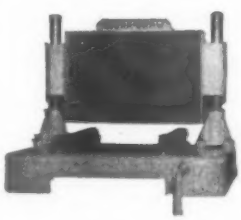
FEDERAL JOLT MACHINES

Air operated, fool-proof jolt machines that ensure uniform cores. Sturdy cast iron construction with no external valves to wear out. Made in four sizes. Get our prices and deliveries.

SHUR-SPOT SPRUE

Designed for use on squeezer-made molds, Shur-Spot squeezes right down with the sand. When the squeezer board is removed, the Shur-Spot pops up and can be lifted right out. The result is a fully completed and properly located pouring sprue that requires no finishing. Shur-Spot Sprue eliminates danger of falling sand.

For complete information on the Shur-Spot Sprue, write for the circular on this low-priced easy-to-use item.



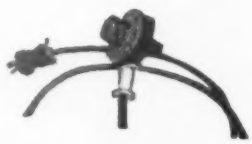
FEDERAL'S "VIBRA-DRAW" CORE DRAWING MACHINE

Cuts costs in your core room by making it easy for every core maker to draw perfect cores as fast as he can fill the core box, place it against the vibrating head and lift the box. Made in two styles: the floor model and the portable bench model shown here. Immediate delivery — write for details.

FEDERAL VIBRATOR No. 2 and 5

Federal's own make and available for immediate delivery. Hard-chromed piston guarantees long life. For 110 volt, 60 cycle, single phase operation. $15.60 each, f.o.b. Cleveland; No. 5 for heavier duty—$20.40 each.

Federal also has a new "convenience outlet knee switch." No taping, soldering or wiring. Plug in—that's all. Carried in stock. $7.50 each, f.o.b. Cleveland, Ohio.



THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

CROWN HILL, W. VA. • CHICAGO • MILWAUKEE • DETROIT • ST. LOUIS

CHATTANOOGA, TENN. • ST. PAUL • NEW YORK • RICHMOND, VA. • UPTON, WYO.

Chamberlain Co., Los Angeles, Calif. · Pacific Graphite Works, Oakland, Calif. : LaGrand Industrial Supply Co., Portland, Ore.

Overseas Commodities, Ltd., Vancouver, B. C. · Newman Foundry Supply, Ltd., Montreal, Que.

Foundry work moves faster with

2 SPEED METEOR ELECTRIC HOISTS

To meet demands for greater production and higher efficiency, many progressive foundries are replacing obsolete, undependable handling equipment with new heavy duty, two-speed Meteors. Designed specifically for foundry work, the Meteor provides slow speed for careful starting of loads... and high speed for fast lifting when the load is free. The Meteor is fully enclosed, weather-proofed and protected against dust and dirt. Airplane-type cooling fins quickly dissipate heat generated by gears and load brake. Low headroom, precision construction, motor thermal protection, only 110 volts in push button station, helical gears, are other quality features. If you want extra value for your investment, write today for literature and prices.

WRITE for Bulletin 142... contains 22 pages of specifications, illustrations and prices.

CHISHOLM-MOORE HOIST CORPORATION

(Affiliated with Columbus McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York • Chicago • Cleveland • San Francisco • Los Angeles

(*Concluded from page* 203)

stances, particularly in small foundries, the drop ball and auxiliary equipment is not available. However, up to the present, the large shops are equipped to handle large pieces of scrap. In the better installations a large piece of scrap is placed in the bottom of a hollow in the ground. This serves as an anvil, something that will not yield when the weight falls on the piece to be processed. This method will be found preferable to the proposed method of operating the drop ball capable of being moved from one end of the yard to the other end. To prevent accidents from flying pieces of iron the scrap breaking area is surrounded by a substantial fence or barricade of split logs or railroad ties. Where a tractor-type crane is available it may be employed part of the day in the scrap yard, handling heavy pieces of scrap, and also hoisting the drop ball.

"Another method of getting rid of heavy scrap is to sell it to the nearest junk dealer who may have the facilities for breaking it up. Firms operating open hearth furnaces for making steel, or other firms operating large air furnaces for melting iron are in position to charge fairly large pieces of scrap.

"Finally, in recent years the oxygen lance has been employed for cutting large pieces of cast iron and steel scrap into pieces which may be incorporated in the cupola charge. One advantage of this method is that the oxygen and acetylene tanks, torches and hoses can be taken to any part of the yard to conduct the cutting operation. The equipment also can be used to perform any other cutting or welding operations around the foundry. A more recent development which facilitates the cutting operation is use of a powdered material which is fed in to a special torch, and speeds up the operation considerably by forming a fluid slag which absorbs the oxides generated during the cutting action."

Booklet Describes Gray Iron Society

An attractive booklet describing the Gray Iron Founders' Society, has been developed for use in conjunction with its membership campaign which was launched in January. The 28-page pamphlet outlines the purpose and objectives of the organization, reviews its contributions to the gray iron castings industry, introduces its officers and staff and includes illustrations of society headquarters in Cleveland.

Smith L-O Core Oil

Available in 20 Grades...Also Special Blends to Specification

For some months now, we have passed along the word that Smith L-O Core Oil is available in *twenty grades* to meet most all casting conditions in both ferrous and non-ferrous foundries.

Even with that many grades available, there are instances in which our in-stock selection may not meet the requirements of unique specialty jobs.

We are prepared to handle such cases in that our facilities can be extended toward the preparation of *special blends* to specification if desired.

Our Practical Foundry Servicemen will work shoulder to shoulder with your staff in determining the blend you require. In turn, our competent laboratory technicians will prepare *your* special core oil in any given amount.

Investigation of our services can result in a mutually profitable relationship. Write, phone, or wire today.

Smith L-O Core Oil

WAREHOUSE STOCKS AVAILABLE
In The Following Cities

- COLUMBIAN WAREHOUSE CO. — Reading, Pennsylvania
- FOUNDRY SERVICE CO. — Birmingham, Alabama
- E. R. FROST CO. — Minneapolis, Minnesota
- MARKET TERMINAL WAREHOUSE — Buffalo 4, New York
- MALCOLM G. STEVENS — Arlington, Massachusetts
- TERMINAL WAREHOUSE — Worcester 8, Massachusetts
- TOMKINS TIDEWATER TERMINAL — South Kearny, New Jersey
- M. W. WARREN COKE CO. — St. Louis, Mo.
- WESTERN FOUNDRY SAND CO. — Seattle, Washington
- WESTERN INDUSTRIAL SUPPLY CO. — Portland 14, Oregon

Smith L-O Core Oil

CORE WASH ROD DIP LIQUID PARTING

SMITH OIL & REFINING CO.
INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

"FALLS BRAND" ALLOYS
AMERICA'S LARGEST PRODUCERS OF ALLOYS

"FALLS"
NO. 11 ALLOY
makes
High Electrical Conductivity
Copper Castings

The manufacturing of high electrical conductivity castings is no longer restricted to a highly specialized group of foundries.

It is now open to all foundries. There are no secret arts or formulae.

"FALLS" NO. 11 ALLOY:

- degasifies and deoxidizes the copper.
- protects the molten copper from reoxidation up to and during the pouring operation.

Insuring

DENSITY, SOLIDITY and HIGH ELECTRICAL CONDUCTIVITY CASTING.

WRITE FOR COMPLETE DETAILS.

NIAGARA FALLS
Smelting & Refining Division
Continental Copper & Steel Industries, Inc.
BUFFALO 17, NEW YORK

WISCONSIN FOUNDRY CONFERENCE

(*Continued from page* 118)

phy and photomicrography, particularly as applied to color work, were discussed by Charles S. Foster, technical advisor, Eastman Kodak Co., Rochester N. Y. Roy McIntosh, Belle City Malleable Iron Co., Racine, Wis., was chairman and Adolph J. Popovich, metallurgist, Allis - Chalmers Mfg. Co., Milwaukee, was co-chairman.

Using color and black and white slides of the same metallic specimens, Mr. Foster pointed out a number of significant inclusions visible when photographed in color but which black and white pictures failed to bring out clearly. Less latitude in exposure time, light values, and other controllable variables which is an inherent feature of color film as compared with black and white, however, makes uniform procedures particularly necessary.

One of the series of slides illustrated variations in results in color work using different sets of filters and light sources. Tungsten and carbon arc lights were discussed, with emphasis being placed on following a uniform procedure in setting the arc.

Describes New Sand Test

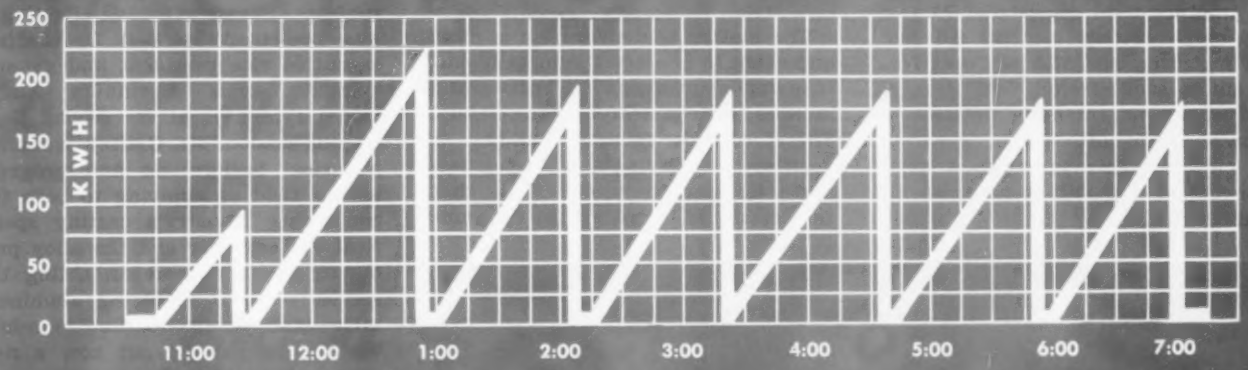
At the concluding session of the Technical group C. C. Sigerfoos, Michigan State College, East Lansing, Mich., described a new test for checking molding sands to determine tendency to scab or buckle when the casting is being poured. Bradley H. Booth, engineer, Carpenter Bros. Inc., Milwaukee, was chairman and Kenneth Geist, technical engineer, Allis-Chalmers Mfg. Co. was co-chairman.

The test consists of exposing a rammed sand sample in a flask cope to a pool of molten iron in the drag. The metal is maintained ½-in. from the specimen. A peep-hole permits noting the exposure time before failure on the specimen surface. No. 2 Albany sand in the raw state failed by drawing down within a few seconds after pouring, but it remained intact for 3½ minutes when 2 per cent clay or a small amount of combustible binder was added. A check on commercial synthetic sands indicated there is a correlation between failure on the exposure test and density as obtained on a standard 2-in. laboratory specimen.

"Cement Molding in the Nonferrous Foundry" was discussed by Charles Schley, president, Philadelphia Bronze & Brass Corp., Philadelphia, with Carl Van Buren, superintendent, Allis-

(*Continued on page* 210)

DETROIT ROCKING ELECTRIC FURNACE



One month's operation of type LFY, 175 KW, 700 lb. nominal cold charge capacity Detroit Rocking Electric Furnace. High strength, alloy automotive irons poured at 2800-3000° F.

• No. heats per day—7 • Av. heat weight—1000 lbs. • Total lbs. cold melted—168,930 • Av. power consumption, including preheat—549 KWH/ton • Av. power cost @ 1¼c/KWH—$6.86 • Av. electrode consumption—4.15 lbs./ton • Av. Electrode cost @ 22c/lb.—$.913/ton • Av. no. heats/lining—253 (9-month average) • Av. refractory cost—$3.64/ton.

NOTE: *Operator handles two such furnaces all day. Furnaces are equipped with automatic electrode control as well as automatic rocking control.*

FASTER, CHEAPER, BETTER MELTS IN SINGLE or MULTIPLE OPERATION

Detroit Rocking Electric Furnaces achieve increased production at reduced costs, with rigid control over quality.

The above operating graph of a type LFY, 175 KW, 700 lb. nominal cold charge capacity Detroit Rocking Electric Furnace melting high strength alloy automotive irons is typical of one day's economical operation. Multiply this day's savings by the working days of the year and you realize the owner's great savings.

Besides optimum power use, all-electric operation precludes handling and storing messy, bulky fuels. Equally advantageous is the positive control of operational speed, composition quality and other melting factors. Out-of-production time due to burned-out linings is minimal. Spare, previously-lined furnace shells are quickly, easily installed.

Other saving features are fast, uniform outputs; lowest metal loss by shrinkage; conversion of shop borings and turnings with least loss from oxidation. The arc is automatically established clear of the molten bath at all times. The metal is never a part of the electrical circuit, assuring uniform temperatures within the melting chamber.

Detroit Rocking Electric Furnaces are available in 10 to 4000 lb. capacities with either conical or cylindrical chambers. Individually designed to meet your plant electrical specifications.

Whether you melt ferrous or non-ferrous metals, send us your production data. Our engineers will furnish you facts on how you gain ultimate operating economy with positive melt-quality control, using the Detroit Rocking Electric Furnace suited to your requirements in size, capacity and use. Address:

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC CO. • BAY CITY, MICHIGAN

(*Continued from page* 208)

Chalmers Mfg. Co., and John Kammermeyer, district manager, Federated Metals Division acting as chairmen. Mr. Schley stated he has used cement in molding sand since 1911. The mixture used consists of 11 per cent quick setting cement, 5.5 per cent moisture, and 83.5 per cent No. 60 silica sand from New Jersey. The usual sand ramming practice is followed, with soft ramming over the pattern. This provides a very strong mold that will stand abuse in handling.

The mold can be poured in any position, and this type of molding can be used for centrifugal casting. The mold is very porous so that venting is not required, and there is no turbulence in the mold due to gas evolution.

The matter of dehydration is most important in producing cement molds. It is important in casting brasses and bronzes to avoid hydrogen pickup. Therefore, the foundry building is ventilated for drying and the temperature is held above 60° F so that the cement will cure, and at the same time dry. Best curing and drying can be accomplished in 72 hours, although 60 is permissible. The mold should be poured immediately after closing to prevent moisture pick-up.

Top row, left to right: H. G. Schlicter, Beardsley & Piper Co.; G. B. Michie, Electro Refractories & Alloys Corp.; C. E. Schley, Philadelphia Bronze & Brass Corp.; R. M. Jacobs, Standard Brass Works. Center row: F. E. Fisher, Hydro-Blast Corp.; F. Frenay and J. Goffart, John Cockerill Co., Belgium. Bottom row: Walter Gerlinger, Walter Gerlinger Inc.; H. E. Ladwig, Allis-Chalmers Mfg. Co.; B. D. Claffey, Acme Aluminum Alloys Inc. (Photos by W. V. Napp, Badger Firebrick & Supply Co.)

Two-directional approach to the subject "Sound Alumina Castings" was presented by Ben D. Claffey, executive vice president and general manager, Acme Aluminum Alloys Inc., Dayton, O., at the second Nonferrous session. Mr. Claffey examined historical background and progress in this field as applying to both the consuming industry's casting specifications engineer and the alloy producing foundry operator. Citing the strides made in elevating aluminum alloy castings from the "garden" variety, he pointed out how a new era was brought to the aluminum castings industry during the war. Castings combining complicated design, greatly improved physical properties, controlled composition and other desirable characteristics can be produced economically.

Reduce Casting Weight

Since the war, he reported, many design engineers have specified aluminum castings as a way of reducing dead weight without sacrifice of safety or strength.

Mr. Claffey's talk was accompanied by slides showing castings meeting the description "sound." Assisting him was Thomas E. Kramer, metallurgist, Acme Aluminum. Chairman of the session was James Claffey, chief inspector, General Malleable Corp., Waukesha, Wis., and co-chairman was Carl Van Buren, superintendent, Allis-Chalmers Mfg. Co., Milwaukee.

Questions submitted by the audience occupied Friday afternoon's Nonferrous "Information Forum." With C. P. Kotowicz, foreman, Ampco Metal Inc., Milwaukee, as chairman, A. R. Tooman, owner, Racine Aluminum & Brass Co., Racine, Wis., as co-chairman, and M. E. Nevins, Wisconsin Centrifugal Foundry Inc., as moderator, the forum's board of experts consisted of A. K. Higgins, metallurgist, Allis-Chalmers Mfg. Co., Milwaukee; William Ball, R. Lavin & Sons, Chicago; E. D. Monney, Federated Metals Division, American Smelting & Refining Co., Whiting, Ind.; and George W. Anselman, foundry superintendent, Woodruf & Edwards Inc., Elgin, Ill.

None of the questions stumped the experts but all brought out helpful discussion, the off-the-cuff answers often being copiously illustrated with blackboard diagrams. One point, in particular, which found im-

(*Continued on page* 212)

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The New

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SAND CONDITIONER

is

SELF LOADING

SELF PROPELLED

Old fashioned, fatiguing, time consuming hand shovelling for conditioning foundry sand is a thing of the past—in foundries where the new Self-Loading, Self-Propelled Royers have been installed. The Royer handles all the sand preparation operations automatically . . . including the culling out of all burnt cores, clay balls and other trash. Finished sand is thoroughly blended, double-aerated, light and fluffy . . . and your Royer can turn out as much as 50 tons per hour. Get all the facts on this new foundry cost-cutting machine. Write for particulars.

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ROYER FOUNDRY & MACHINE CO.

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R-C Centrifugal Blower, Type OI, in foundry cupola operation. Capacity 4,400 CFM, 40 HP motor.

Standard Rotary Positive Blower, Type RCD, built in 8" to 22" gear diameters.

With a wide choice of Centrifugal and Rotary Positive Blowers available, you can usually select standard R-C units to meet your specific applications. Capacities range from 10 CFM to 50,000 CFM or higher for special requirements. Roots-Connersville is the only blower manufacturer offering you this *dual choice*.

We're impartial as to drives, too. We supply them or you can utilize drives already available.

With R-C equipment on the job, you'll enjoy long-time, trouble-free performance. That's because of sound design and sturdy construction, based on 95 years of building gas and air handling equipment, *exclusively*. For any such problem, consult R-C *dual-ability*.

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BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

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(*Continued from page* 210)

mediate agreement among the forum participants concerned importance of melting, speakers emphasizing the necessity of always keeping its operation in competent hands.

Permanent molds provided the subject for discussion at a joint meeting of the Nonferrous and Pattern groups, with Michael C. Frankard, purchasing agent, Delta Mfg. Co., Milwaukee, and A. R. Tooman, Racine Aluminum & Brass Co., Racine, serving as co-chairmen. In describing various factors to be considered when making permanent molds, Sven Sandelin, manager, Central Pattern Works, Racine, traced the development of various types of molding methods, including use of matchplates and cope and drag patterns, plaster castings, die casting, investment casting and permanent mold casting. Steady growth in use of permanent molds has reflected the need for lower costs on long production runs.

Mr. Sandelin presented a number of slides showing permanent molds developed for production of aluminum castings, citing the various costs involved and comparing them with costs for producing the same castings in sand.

Discusses Patterns

Timothy Cox, Speed Meal Corp., Racine, described briefly the operating details involved in permanent mold casting of aluminum.

Patternmaking is the higher art of castings manufacture, asserted Walter A. Balton, assistant foundry superintendent, Link-Belt Co., Chicago, in addressing the first pattern session on "What a Foundryman Expects of Pattern Equipment." Chairman of this session was A. Huebner, foreman, Allis-Chalmers Mfg. Co., Milwaukee, and co-chairman was Leonard J. Gratz, accountant, G. & O. Pattern Works, Milwaukee. Production of good castings is the result of proper planning which requires cooperation between the patternmaker and the foundryman.

First step in this co-operative effort, said Mr. Balton, is to agree on a good plan. Economical castings will result. Conferences should be conducted while the casting is in the blueprint stage. Preliminary conferences can effect substantial savings. Both the patternmaker and foundryman should seek accurate patterns of durable construction that will withstand normal handling. Determination of proper methods of gating and risering is most important.

Frank Kulka, general superintendent Motor Castings Co., Milwaukee,

(*Continued on page* 214)

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ABRASIVE CO.
Philadelphia, Pa.
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More grinding . . . done faster! That's the story of Simonds Abrasive high speed resinoid bonded grinding wheels . . . especially efficient for rough snagging work in foundries and steel mills where fast stock removal at reasonable cost is the prime consideration.

Also used for high speed abrasive cutting-off operations and many precision finishing jobs such as roll grinding, saw gumming, disc grinding and surfacing with segments.

Send for our Grinding Wheel Data Book for complete information and specify SIMONDS ABRASIVE to your nearest Simonds Abrasive Distributor.

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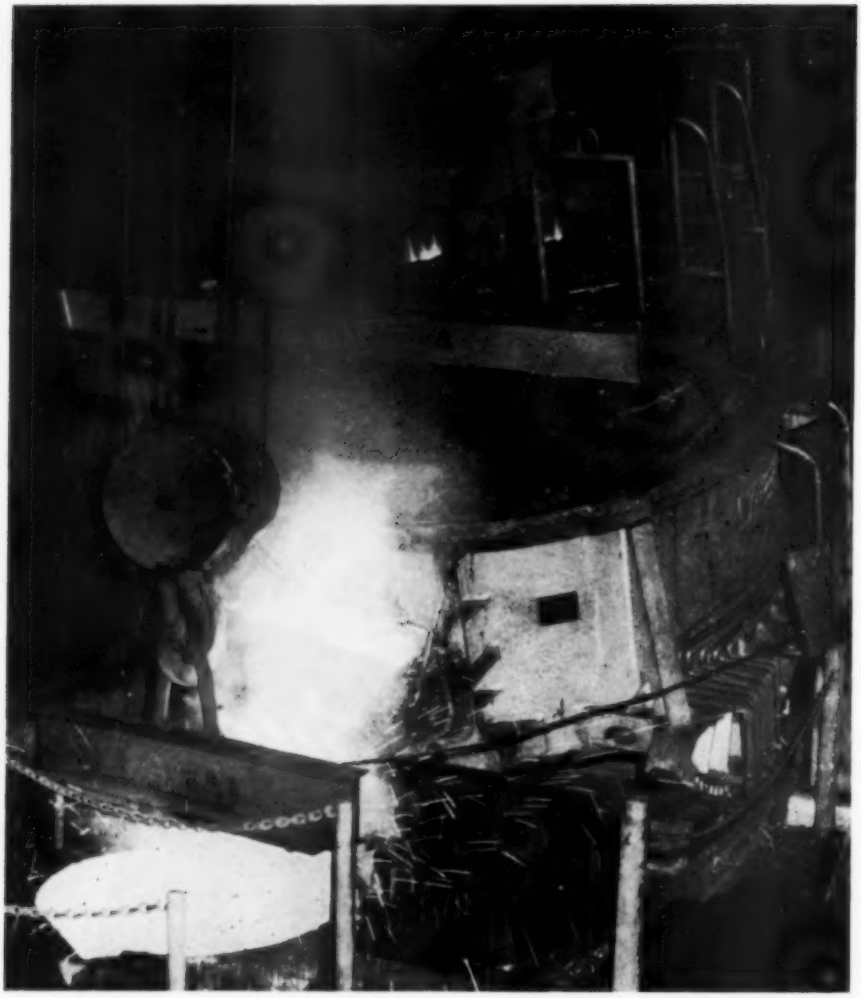

One of the important time-saving characteristics of this Moore Rapid Lectromelt furnace is the unique four point roof suspension. The tilted position of the size OPT Lectromelt furnace shows this construction principle advantageously. This system makes the removal, replacement and alignment of the roof very easy and very quick. The roof ring is suspended from sturdy outrigger arms by means of especially designed screw operated clips under the ring's top angle and supported at four points. This type of construction also securely locks the roof and superstructure in place.

Moore Rapid Lectromelt Furnaces are available in capacities ranging from 250 pounds to 100 tons. For full details, write today for the Lectromelt catalog.

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(*Continued from page* 212)

presented an interesting paper "Specialized Production Patterns" at the second Pattern session, with Alfred M. Fischer, vice president Charles Jurak Co., as chairman and W. Kollmorgen, Kollmorgen Pattern Works, co-chairman. Mr. Kulka stressed the need for close study of the blueprint or drawing in order to determine the various operations which will be followed in the foundry. Attention should be given to the possibility of simplying production, and consultation with engineers of the customer may be of mutual benefit. He stated it is often more adventageous to spend money for cores than to spend it in the cleaning room. He stressed the advantage of cores and skin dried molds.

The speaker indicated the desirability of the customer supplying the foundry with a qualifying fixture. Such equipment saves castings for the foundry and for the customer. The fixture should be designed so that the locating point can be ground to line up with the fixed point on the fixture. This method eliminates the removal of the casting from the fixture for grinding the locating points and provides the means for producing the points accurately. Mr. Kulka stated that the pattern shop should also have the job of building the qualifying fixture.

Favors Plastic Patterns

An interesting symposium on plastic pattern equipment concluded the Pattern group's sessions. Chairmen for this meeting were Albert Huebner, foreman, Allis-Chalmers Mfg. Co., and Leonard Gratz, owner, G. & O. Pattern Works. Martin Rintz, Continental Foundry & Machine Co., East Chicago, Ind., described various types of plastic equipment his company makes and employs in mold and core work. He indicated that it was found more economical to replace patterns and coreboxes in plastic than in other materials, absence of machining being a factor. Plastic coreboxes have stood up unusually well in service and provide good freedom from sand sticking regardless of temperature.

A. F. Pfeiffer, Allis-Chalmers Mfg. Co., presented a report on a comprehensive study that company has made of the relative costs of various types of plastic and aluminum matchplates. These findings indicated that neither material is most advantageous in all cases. S. Denkinger, Atlas Plastic & Aluminum Pressure Plate Co., Milwaukee, agreed that plastic is no cure-all for pattern

(*Continued on page* 216)

SCHNEIBLE DUST CONTROL and VENTILATION

PAYS FOR ITSELF 4 WAYS

Small Uni-Flo Hood on foundry shake out—note overhead installation of dust collector and usable floor space. Short duct work saves in initial outlay and power.

FRESH OUTSIDE AIR gives clean comfortable working conditions, thus reducing labor turnover.

NO SMOKE AND DUST eliminates abrasive and corrosive elements thereby lengthening life of motors and other expensive facilities.

BETTER VISIBILITY AND GREATER COMFORT lessens accidents to workmen.

OVERHEAD INSTALLATION of Schneible Multi-Wash system allows valuable floor space to be used for production.

Schneible Uni-Flo Dust Hoods are made in any practical size for any type of plant layout, adjacent to the process of operation where dust or fumes are created.

The Schneible Multi-Wash Collector can either be inside overhead or outside the building. Duct work does not interfere with normal plant operation.

Compensating-Fractionating Uni-Flo Hood reduces dust collector cost and loss of plant heat.

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Compensating Uni-Flo Hood in operation lowers ventilating and heating costs while improving working conditions.

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No need of a pallet in handling big castings or other bulky units. There's practically no limit to the number of daily chores in a metals plant that can be performed quickly, safely and at remarkably low cost by Clark's 1000-lb. Truckloader

WRITE FOR *Material Handling News* —"must" reading.

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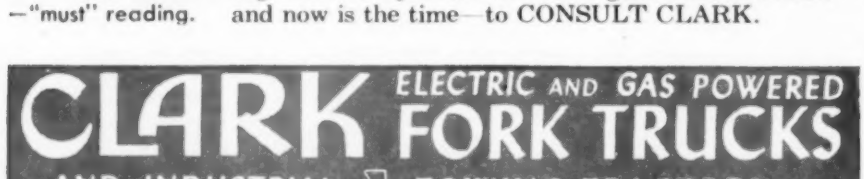


INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 16, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

(*Continued from page* 214)

production problems and is not satisfactory in all cases. He added that it is likely an improved quality of plastic materials will be available in another year of two.

On the premise that it is impossible to make consistently good cores with antiquated, inefficient baking methods, W. Harvey Payne, Chicago district representative, Foundry Equipment Co., Cleveland, described to the opening Gray Iron session fundamental factors to be considered in core baking and various types of equipment used. Chairman and co-chairman, respectively, were Harold K. Sohner, foundry metallurgist, International Harvester Co., Milwaukee, and A. R. Janes Jr., Standard Foundry Co., Racine, Wis.

Regulate Baking Time

Four factors influencing quality of finished cores are temperature, baking time, kind of oven atmosphere and circulation of gases within the oven. Since from the practical standpoint cores of similar size and cross section cannot be baked separately in most foundries it is wise to keep baking temperatures as low as possible, striving for a temperature range which will not be excessive for thinner sections while still permitting heavier core sections to bake in a reasonable time. A frequently overlooked factor having a detrimental bearing on baking time is use of excess dead weight in the oven in the form of core plates, racks, etc. Elimination of unnecessary weight will result in a two-fold saving: From fuel loss, and from labor cost.

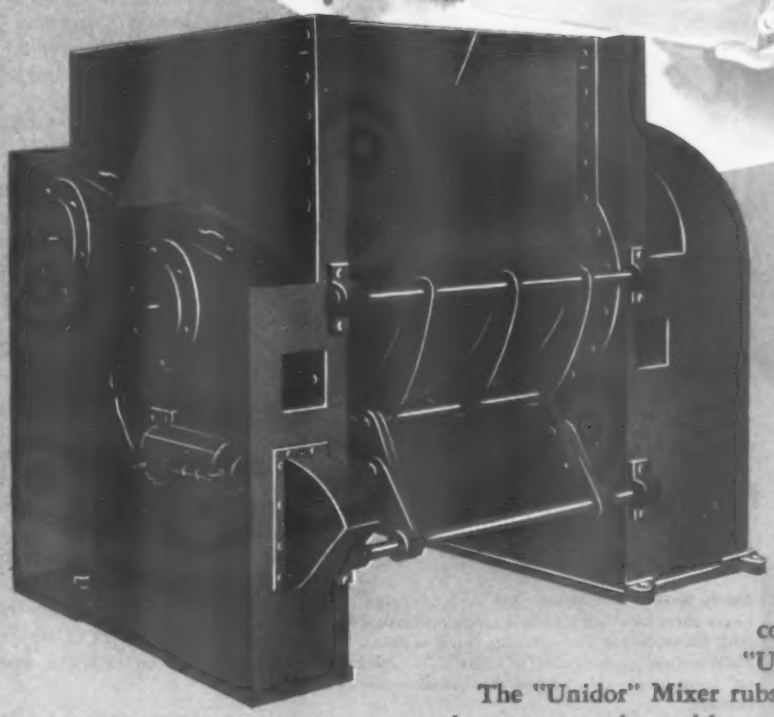
The second Gray Iron session, at which Harry E. Gravlin, metallurgust, Ford Motor Co., Dearborn, Mich., conducted an analysis of defects in castings, was a conference highlight, his performance being as dramatic as it was enlightening. The session went beyond the allotted 90 minutes with the subject only half disposed of, and after the first five minutes it was an "SRO" crowd. The speaker's demonstration was capably aided by the skilful chairmanship of George P. Antonic, metallurgist, Walter Gerlinger Inc., Milwaukee. Leslie Woehlke, Spring City Division, Grede Foundries Inc., Waukesha, Wis., was co-chairman.

At the outset, Mr. Gravlin posed the question as to whether a casting defect can be attributed to sand, metal, men or equipment. He pointed out that when Ford Motor encounters defects in production runs, it calls together the various individuals who have a part in the making of the castings to explore exhaustingly all

(*Continued on page* 218)

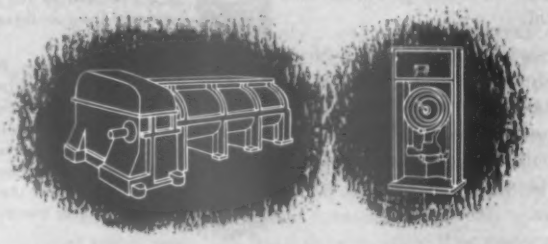
better core sand means fewer rejects

Baker Perkins Unidor core Sand mixer



Consistently better castings with reduced spoilage is the result of preparing core sand in a Baker Perkins "Unidor" Core Sand Mixer. The "Unidor" Mixer rubs, stirs and kneads sand all in one operation without need for aerating attachments. A thin layer of bond is distributed uniformly *around each grain of sand,* resulting in 100% benefit from bonds, binders, oils or other compounds used. Sand grains are not broken up, leaving it with a high degree of permeability. Extremely low maintenance required. Available in laboratory and batch-type sizes, up to 25 cu. ft. ✓ ✓ ✓

Other Baker Perkins foundry equipment, includes Liquid Meters which *automatically and accurately control the flow* of binder oil or water into the mixer, and Baker Perkins Continuous Sand Mullers which are available in 30, 40, 60 and 120-ton-per-hour capacities.



Baker Perkins SAGINAW, MICHIGAN • FOUNDRY EQUIPMENT SALES

BAKER PERKINS BUILDS EFFICIENT FOUNDRY EQUIPMENT

(*Continued from page* 216)
possible causes of the defects. This procedure, he pointed out, pays good dividends. With this explanation, he removed his coat, rolled up his sleeves, moved from the microphone down into the audience, and went to work. His only props were a blackboard and a defective gray iron farm implement casting which he had seen only 15 minutes before the session started.

The casting, a simple ring double-gated from a single sprue, contained blowholes or shrinks adjacent to the gates. There was no unanimity in the audience as to whether the defects were blows or shrinks. Consequently Mr. Gravlin drew out by questions all of the sand conditions which could produce either type of defect and developed corrective measures which might be applied. The discussion progressed with varying shades of opinion and covered natural and synthetic sand, sand moisture, bond, green strength, permeability, distribution, density, heat conductivity, ramming, sea coal content, gas content, etc. From sand, the analysis moved along to metal, in which factors discussed were temperature, chemical analysis, sulphur and phosphorus, gas, and the like. At this point, time ran out, but Mr. Gravlin had already convincingly demonstrated that the causes of defects can be determined only by exhaustive analysis of all conditions under which a casting is made.

At the third Gray Iron session, Ben G. Thiel, purchasing agent, Waukesha Motor Co., Waukesha, Wis., discussed "What the Purchaser Expects from the Foundry." Leslie Woehlke, Spring City Division, Grede Foundries Inc., Waukesha, Wis., presided and Fred W. Busche, president, General Foundries Co., Milwaukee, was co-chairman. The company with which the speaker is associated does not operate a foundry, but buys 1500 tons of castings monthly, mostly gray iron, and also purchases most of its patterns. Company manufactures 15 types of internal combustion engines up to 400 horsepower.

Keeps Check on Castings

Through use of "Inspection Quality" cards, the company maintains a constant check on castings received and processed. The speaker explained that when a new casting is put into production, the inspection department studies the blueprint and lists possible defects which may cause machining difficulties. If and when a difficulty is encountered, the card is used as a check. It was the opinion of Mr. Thiel that casting defects yield to technical study, and that foundrymen must become quality control conscious to reduce scrap. In 1947, he continued, the company was obliged to absorb 2 hours of direct labor per ton of castings chargeable to defects, and in 1948 return of castings due to defects was 6.9 per cent.

Co-operation with foundries frequently leads to improved castings, Mr. Thiel stated. Sometimes this is accomplished by pattern redesign. Furthermore, redesign of castings frequently can result in better castings at lower cost. In conclusion, the speaker observed that his company's biggest casting defect problem is porosity which causes leaks in castings which must be leak-proof.

"Observation of Cupola and Related Problems in the Foundry" was the subject which H. Kenneth Briggs, metallurgist, Miller & Co., Chicago, discussed at the final Gray Iron session. J. V. Olle, metallurgist, Motor Castings Co., West Allis, Wis., presided as chairman, and H. K. Sohner, foundry metallurgist, International

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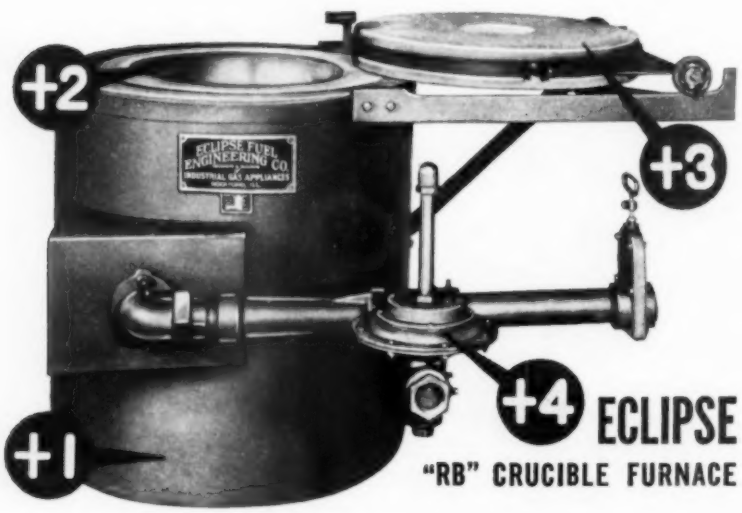

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"PLUS"

For heavy foundry production in melting brass, bronze, aluminum and other alloys, this Gas-Fired Eclipse Crucible Furnace meets every requirement — and in addition has many "plus" construction features that make it unusually practical and economical.

The Eclipse line of Gas-Fired, Non-Ferrous Metal Melting Furnaces includes a size and type to fit your foundry needs. Write for Bulletin C-2 describing various models of crucible furnaces, with full specifications.

+1 **Sturdy Shell Construction:** The furnace shell is heavy sheet steel with welded seams reinforced with flat stock band to eliminate top distortion. Shell bottom is constructed of heavy plate raised off floor to provide proper ventilation under furnace.

+2 **Cover Construction:** The roll back cover provides a tight-fitting seal between furnace and cover and helps keep floor space to a minimum. Heavy cover frame work and roller rails combine to make a durable cover arrangement.

+3 **Lining:** The highest quality of refractory materials is used in the furnace lining to give a lining of long endurance.

+4 **Burner and Mixing Equipment:** The burner equipment supplied on this type of equipment consists of a McKee Special Walltite burner designed for high production melting. Proper air-gas ratio adjustment is maintained by using a McKee Low Pressure Proportional Mixer. Regulation of heat input is easily controlled by the single valve control of mixer.

Eclipse Fuel Engineering Company
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McKee Eclipse

Only the Auto-Bloc gives you light weight with heavy-duty strength plus a lifetime guarantee

Auto-Bloc in use at National Malleable & Steel Castings Co., Cleveland

Since DR DAVID ROUND HOISTS & CRANES 1869

IN modern plants, where efficiency is the key to profitable operation, you'll find increasing standardization on David Round Auto-Blocs.

The reasons: *Only the Auto-Bloc combines light weight, small dimensions, ease of installation and handling with rugged heavy-duty strength. Only the Auto-Bloc guarantees its hoisting gears for life.*

Every Auto-Bloc heavy-duty working part is generously made of chrome manganese hardened steel. No light metals are employed at any point. There's no skimping . . . or substituting.

Yet, because of its simplified 2-gear lifetime hoisting mechanism, the heavy-duty Auto-Bloc is lighter than complicated multi-gear hoists. Auto-Bloc design saves up to 35% on weight without sacrificing an ounce of structural strength.

HOW THE AUTO-BLOC WORKS!

Fig. 1

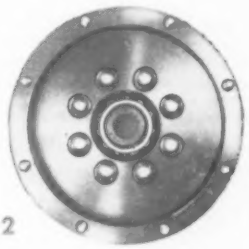

Fig. 2

Auto-Bloc employs only 2 gears—a cam-actuated floating inner gear (Fig. 1) and an outer gear to which load sheave is rigidly connected. In outer cover of hoist (Fig. 2) are 8 hardened steel balls. Pull on hand chain causes cam shaft to revolve, actuating floating inner gear which moves eccentrically over inner circumference of outer gear. Held in one position relatively by 8 balls, inner gear cannot rotate and compels movement of outer gear and load sheave. *Auto-Bloc gears carry a lifetime guarantee.* David Round & Son will replace free of charge any gears which fail in service, regardless of the age of the hoist, when operated in accordance with material handling manufacturers' standards.

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(*Continued from page* 218)

Harvester Co., Milwaukee, was co-chairman.

The remarks of Mr. Briggs covered a wide sweep, involving cupola design and operation, fuel and metal charge, melting and pouring temperatures, analysis, alloy additions, pouring methods, use of the electric furnace in conjunction with the cupola, and many other detailed problems.

The first Steel sectional meeting was devoted to a discussion of "What Do We Know About Sand?" by J. B. Caine, chief metallurgist, Sawbrook Steel Castings Co., Cincinnati. Eugene Schneider, superintendent Milwaukee Steel Division, Grede Foundries Inc., was chairman and V. E. Ziemer, superintendent, Maynard Electric Steel Casting Co., was co-chairman. Mr. Caine spent the principal part of his talk in an endeavor to debunk some of the preconceived or accepted ideas with regard to sand. As an example, he pointed out that the green strength of several different types of bonds depends more on the moisture content of the sand mixture than on the properties of the bonding material. He stated that the moisture content and the degree of ramming are the two major factors in sand governing the production of good castings.

In discussing penetration, he indicated that soft ramming often is the cause of burned-on sand. The soft ramming may be due to the fact that the molder is not doing his job, or because he is not given a suitable sand which can be properly rammed within the time allowed by the cost department.

At the second Steel session, Charles Locke, supervisor of foundry process research, Armour Research Foundation, Chicago, discussed "Some Modern Concepts on the Theory of Risering." This session was conducted under the chairmanship of A. M. Herrmann, superintendent, Steel Foundry Division, Belle City Malleable Iron Co., Racine, Wis., with Lewis G. Shaw, production manager, Pelton Steel Casting Co., Milwaukee, as co-chairman.

Since risers are not salable, economics requires that they be only large enough to provide the required amount of metal at the proper time. Hence, according to Mr. Locke, determination of the most efficient riser size by a mathematical relationship between it and the casting has been a quest of utmost importance.

For a casting to solidify, it must lose heat and drop in temperature. This heat loss depends upon the ability of the mold material to absorb or transfer heat from the metal. Mr. Locke pointed out that two lines of attack on thermal characteristics of the mold material have been pursued, one being an empirical approach correlating amount of solidification with temperature change, the other being mathematical analysis based on the physicist's concept of heat transfer. The speaker devoted his attention to several recent investigations which have thrown additional light on determination of most efficient riser sizes.

(*To be concluded*)

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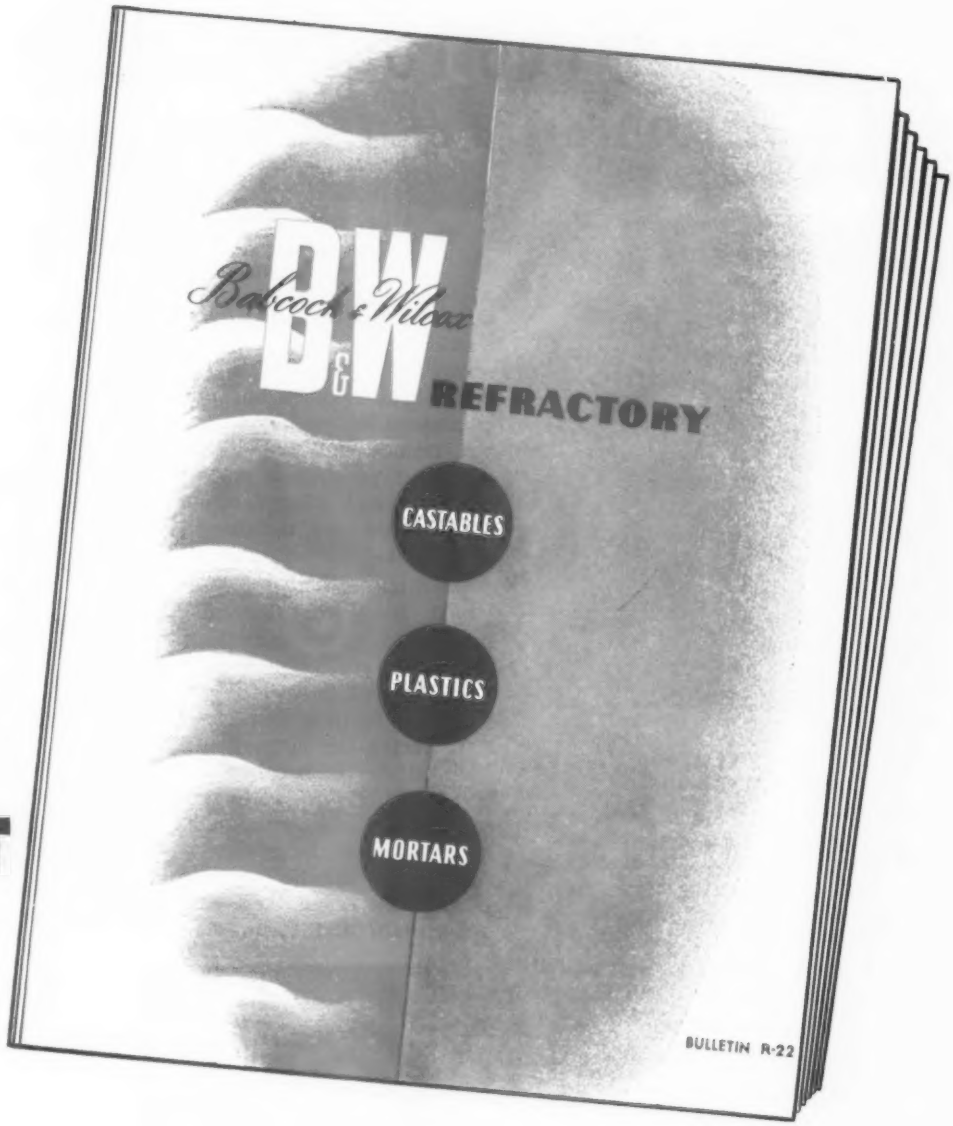

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NONFERROUS FOUNDRY DEVELOPMENTS

Discussed at U. S. Navy Conference

By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY

NEARLY fifty representatives of Navy shipyards, the Naval Research Laboratory, and the Bureau of Ships of the U. S. Navy Department met at Norfolk Naval Shipyard, Portsmouth, Va., on Feb. 8, 9 and 10 to discuss developments in nonferrous foundry technique. Meeting was sponsored by the Bureau of Ships, and Stanley W. Brinson, master molder, Norfolk Naval Shipyard, was moderator of the conference. Sessions were opened by Capt. N. W. Gokey, acting commander of Norfolk yard, who welcomed those present and pointed out the importance of castings in ships and other materiel, and the need for producing strong, solid castings of minimum weight.

Lt. F. L. Doty, representing Comdr. R. H. Lambert, Bureau of Ships, Washington, pointed out that during the early part of the war, castings were accepted although they were not up to specification. However, work by various organizations improved conditions and eliminated many of the problems. Present activities are concerned with correlating service data from the service field with laboratory and shop experience, and carrying on research work to aid in producing the best possible castings.

G. E. Dalbey, Mare Island Naval Shipyard, Mare Island, Calif., described investigations on methods to produce radiographically sound bronze castings. Specimen used for the investigation was a truncated cone 6 in. high, 3¼ in. in diam at the top and 2 in. in diam at the bottom, and open top poured in green-sand, dry-sand, and graphite molds. A disk, ½-in. thick, cut transversely 1½ in. from the bottom was used for radiographic examination. With the graphite mold at 65° F and 400° F, there was no scattered porosity, and the specimen showed a deep pipe similar to steel. With dry sand molds the specimen showed collapse or pulling in from the sides about one-half the way down. Where the metal was covered with charcoal, porosity was present near the top. In green-sand molds porosity showed up near the bottom while use of charcoal drove the porosity toward the top of the specimen.

In addition, a number of globe valve castings were made with variations in gate and riser sizes. Sections examined radiographically showed porosity in seat and flanges which was reduced but not entirely eliminated by enlarging the risers. Mr. Dalbey said that further work, including pouring at different temperatures and other methods of gating and risering including insulated risers, was contemplated.

Thornton C. Bunch, Pearl Harbor Naval Shipyard, Honolulu, T. H., stated that interdendritic shrinkage was found in valve bodies ranging from 4 to 12 in. in size, and that it was reduced to a considerable extent by reducing the pouring temperature to 1950° F. Material was Navy G. Mr. Bunch also described results obtained on thin-wall tapered cylinders obtained from long truncated cone specimens cast horizontally. Specimens were 12 in. long, 3 in. at the large diam and ⅝-in. diam at the small end. Castings were gated into the large end through a riser 3 in. in diam and 12 in. high. Tapered cylinders 1½ x 1⅜ x 5¼ in. were turned from these castings between the 2 and 3 in. diam. The walls were 1/16-in. thick, and none leaked under a 500-psi water test, whether the grain structure was coarse, fine or intermediate. Mr. Bunch said that in making valve bodies it appeared that synthetic type molding sands permitted quicker freezing than natural molding sands as they were of finer grain size. He also stated that use of wedge shape flanges (thicker at the top than at the bottom) and chills on valves reduced, but did not eliminate, shrinkage.

STANLEY W. BRINSON
Master Molder, Norfolk Naval Shipyard, and moderator of the conference

Harold Bernstein, Naval Gun Factory, Washington, spoke on the use of oxygen-bearing copper for production of dense, pressure-tight phosphor bronze. The copper contains about 0.75 per cent oxygen and, while not yet available commercially, it has shown good results. With the 88 per cent Cu, 8 per cent Sn, and 4 per cent Zn alloy, using 10 per cent of the total charge as oxygen-bearing copper, the resultant alloy showed a tensile strength of 50,400 psi, an elongation of 55 per cent in 2 in., and a specific gravity of 8.75. Made with the regular copper, the physical tests gave a tensile strength of 43,300 psi, an elongation of 31 per cent in 2 in., and a specific gravity of 8.04.

L. DePue, Naval Research Laboratory, Washington, discussed the effect of silicon on the 88-8-4 alloy, pointing out that it apparently was impossible to produce the alloy with less than 0.006 per cent Si, but that this amount had very little or no effect. Increase in Si content in the range 0.03 to 0.09 per cent decreased pressure tightness, and the minimum tensile strength and elongation were obtained, but the yield strength was not affected. Increase in silicon content also results in an increase of precipitation of the delta constituent in the structure.

In the sessions held Wednesday, Feb. 9, B. N. Ames, New York Naval Shipyard, Brooklyn, N. Y., described some tests with melting in indirect-arc electric and open flame furnaces with and without phosphor-copper as a deoxidizer. Metal was heated at temeperatures of 2500, 2400, 2200 and 2100° F, and poured at temperatures from 1850 to 2000° F at 50 degree intervals. With the open flame furnace with phosphorus deoxidation, peak ultimate strength was obtained at 1950 to 2000° F, while peak elongation was secured at 2000° F. Without phosphorous deoxidation, best ultimate strength and elongation were found at 2050° F. With indirect arc melting, peak ultimate strength was obtained at 2000° F and peak elongation at 2000 to 2050° F with and without phosphorous deoxidation.

(*Concluded on page* 224)

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DESPATCH OVEN COMPANY

(*Concluded from page 222*)

He also indicated that with lower pouring temperatures the structure tended to crystallize in columnar form, and as temperature was increased crystallization became equiaxed and then changed to random orientation—the most desirable. This usually occurred at 1950 to 2050° F.

W. H. Baer, Naval Research Laboratory, Washington, spoke on effect of melting practice and degasification of gun metal, and gave information on melting in an induction furnace under air, dry charcoal and wet charcoal. Melting under air with subsequent deoxidation with phosphor-copper gave good physical properties, under dry charcoal less favorable, and under wet charcoal poor. Under the charcoal covers there was not much loss in zinc, but without any cover the loss was considerable.

W. H. Richmond, Boston Naval Shipyard, Boston, described some work on grain size control of nonferrous castings. By use of x-ray and machining it was determined that the skin thickness in green sand usually is about 0.033-in. Additions of titanium gave some grain refinement, but did not increase the skin thickness.

Opening paper on Thursday's session was by B. N. Ames, New York Naval Shipyard, and related to the use of tantalum sheet and potassium tantalum fluoride to degasify bronze. Molten bronze was paddled or stirred with a thin sheet of tantalum 4 x 5 in., and the tantalum salt was stirred in. Both increased fluidity of the bronze and degasified it with increase of tensile strength and elongation of the alloy. L. DePue, Naval Research Laboratory, presented some results on welding bronze castings.

In the absence of E. D. Boyle, Puget Sound Naval Shipyard, Bremerton, Wash., his paper on insulated risers was presented by Clyde L. Frear, Bureau of Ships, Washington. Material used for insulation was composed of 3¾ lb diatomaceous earth, 12 oz bentonite, and 1 pt resin composed of 160 grams phenol formaldehyde resin, 240 grams alcohol and 2 qt water. The resulting mixture is of the consistency of putty and can be formed into any desired shape. Previous to use it is baked at 400° F. After use if can be ground up and used on top of risers for insulation. A sand mixture found suitable for making knockoff cores consists of 15 lb bontonite, 25 lb silica flour, and 150 lb silica sand.

Suggest Gate for Cylinder

B. N. Ames, New York Naval Shipyard, described the application of gamma ray examination to develop satisfactory gating and risering of castings preparatory to placing them in production. E. T. Moskowski, Naval Research Laboratory, Washington, described some problems involved in producing a cyclotron casting weighing 1600 lb which had to meet radiographic requirements. This was followed by a roundtable discussion of methods to produce a jacking cylinder with which trouble was encountered in leaking along the inner wall around a piston inserted in the cylinder. One suitable method was to place the cylinder solid end down and step-gate into the bottom, halfway up and at the top with two risers diametrically opposite at 90° to the downgate.

Noah Kahn, New York Naval Shipyard, discussed briefly a new radiographic scale or calculator for determination of the proper exposure for various types of alloys. Circular in form the calculator permits conversion of any alloy to steel thickness exposure data, and adjustment of the exposure to any film material.

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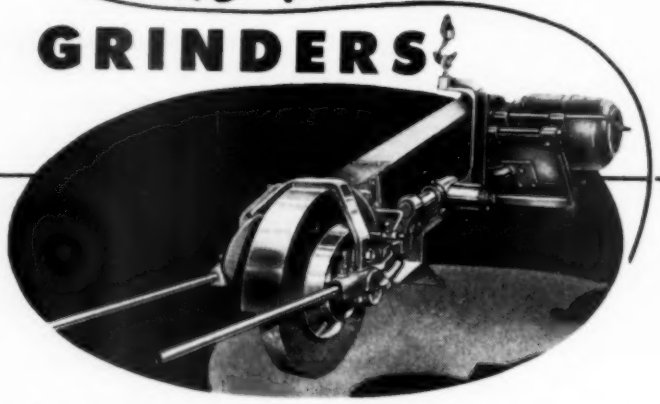

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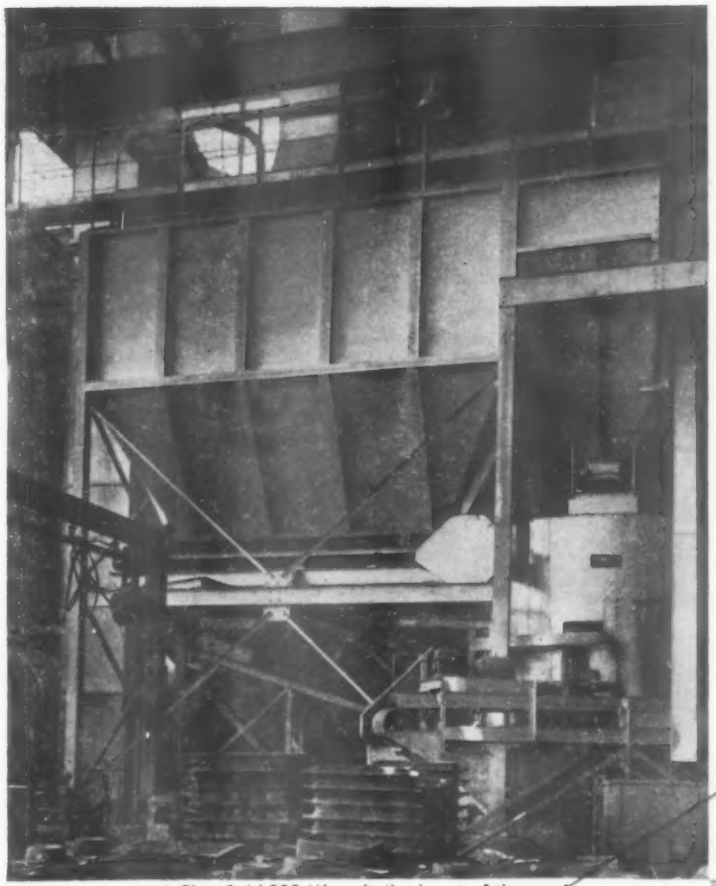

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FOUNDRY PRACTICES ARE CHALLENGE TO PATTERNMAKER

(*Concluded from page 80*)

The difference in time consumed looks greater when quoted as being 30 per cent, rather than in round numbers. Should a buyer see a 30 per cent difference in quoted prices without specifications being available, and not knowing the shop standards of workmanship, he would be tempted to place the order with the lowest bidder.

Variation in accuracy standards of the patterns was 82 to 98 per cent. This was on the basis of 24 dimensions checked by two checkers. The same men checked all patterns so as to keep an equal standard of checking and prevent influence of individual differences.

The variations in molding possibilities can be summed up as follows:

1. Green sand molding with only a pattern furnished.

2. Green sand molding with ram-up blocks furnished.

3. Green sand molding with a follow board furnished; pattern to be cast (a) all in drag (b) inside coped out (c) inside dragged out.

4. Pattern in green sand with a cover core.

5. Split or parted pattern that parted (a) through the center (b) through the metal thickness with enough core to provide for rigidity of construction of cope section.

When a pattern as simple as the one discussed here presents so many choices of construction and moldability, is it any wonder then that the pattern apprentice—and in many cases the patternmaker—scratches his head and wishes someone else would decide these factors, for him? Especially is this true if the molder, being as much an individualist as the patternmaker, takes into consideration his plant layout, experience of his personnel and type of equipment, in deciding the choice.

Consultation Necessary

G. L. Hartman, vice president and general manager of the Milwaukee Flush Valve Co., expressed himself as follows in his paper "Pattern Purchasing." "Complicated designs require consultation with the patternmaker because there are many ways in which a pattern may be constructed which may cause the foundryman trouble, and there are relatively few methods which lead to good pattern construction and sound foundry practice. . . . . Even after the buyer, engineer and patternmaker agree on a procedure, the foundryman may throw a monkey wrench into the machinery by asking to have a pattern rebuilt to suit his own conditions."

A plea for more foundry training, wherever possible, for the pattern apprentice is not amiss. In the case of schools, this would not be on the basis of an equal exchange with foundry apprentices, since the pattern apprentice should have much more contact with the foundry than the molder apprentice with the pattern shop.

And, last but not least, the sooner specifications are set up for pattern buying, the sooner will it be easier and fairer for the seller in quoting prices and the buyer in selecting from the competitive bids.

Reference

1. "The Growing Importance of the Patternmaker." *American Foundryman*, August, 1947, p. 21.

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HIGH-STRENGTH CAST IRONS

(*Continued from page* 73)

rials may be summarized as follows:

A. Improvement of the graphite particle size, distribution and quantity.
   1. Production of type A graphite by prevention of under-cooling.
      a. Composition control
      b. Inoculation
   2. Production of nodular graphite in pearlitic malleable iron.
   3. Production of nodular graphite directly in the casting.

B. Improvement of the as-cast matrix by analysis control and by alloying.

C. Improvement of the matrix structure by heat treatment.

To illustrate the production of high-tensile cast iron, in which many of the factors are considered, some of the steps used in the production of high-strength cast iron piston rings will be described. Fig. 10 shows the method used in making individual castings which involves patterns of predetermined shape and the most exacting sand control.

Several years ago it became apparent that with the continuing improvement of engines of all types, the cast iron piston rings which we had formerly made for years were rapidly becoming outmoded due to increased output of engines. This made it essential to develop a new material which would fulfill the fundamental requirements of a piston ring and show physical properties beyond those now obtained from gray iron. Considerable work had been done in the use of a pearlitic malleable material for piston rings. While there were cases where it was successful, there were many which indicated it had shortcomings. Most of these rings were made from statically cast sleeves and, as often the case, these sleeves contained flaws and porosity, thus making the material appear to be unsatisfactory.

Examine Piston Ring Metal

In the Research Laboratory the investigation of centrifugal casting of various piston ring materials was undertaken, as it was obvious from the beginning that this method was more economical and greatly simplified over the present process of making individual castings. The present process of making piston rings by the majority of companies in the United States is to cast them individually. Actually, casting piston rings individually is a form of precision casting. Fig. 9 shows a "tree" of piston rings cast from the sand molds and illustrates why this method of making piston rings is difficult. Such problems as sand pits, misruns, hard rings caused by under-cooling, are only a few of the problems encountered in this method of making piston rings.

Difficulties such as those listed made it more obvious that the centrifugal casting of piston rings was more ideal, and this has been confirmed by the British, since the majority of their piston rings are centrifugally cast. The object of high-tensile piston ring iron was to produce, in view of the ring breakage which was taking place, a material with exceptionally high strength and with good wear resisting properties. The first material, a white iron containing 1.00 per cent Ni, 1.00 per cent Mo, with a total carbon content around 3.00 per cent and a Si range of 1.25 per cent, partially malle-

(*Concluded on page* 230)

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Casting output was severely hampered in a large mid-Western foundry due to the limited capacity of the core room — in-and-out time was too slow. In this case, reduced baking time was the only logical answer and it called for a change in core mixes.

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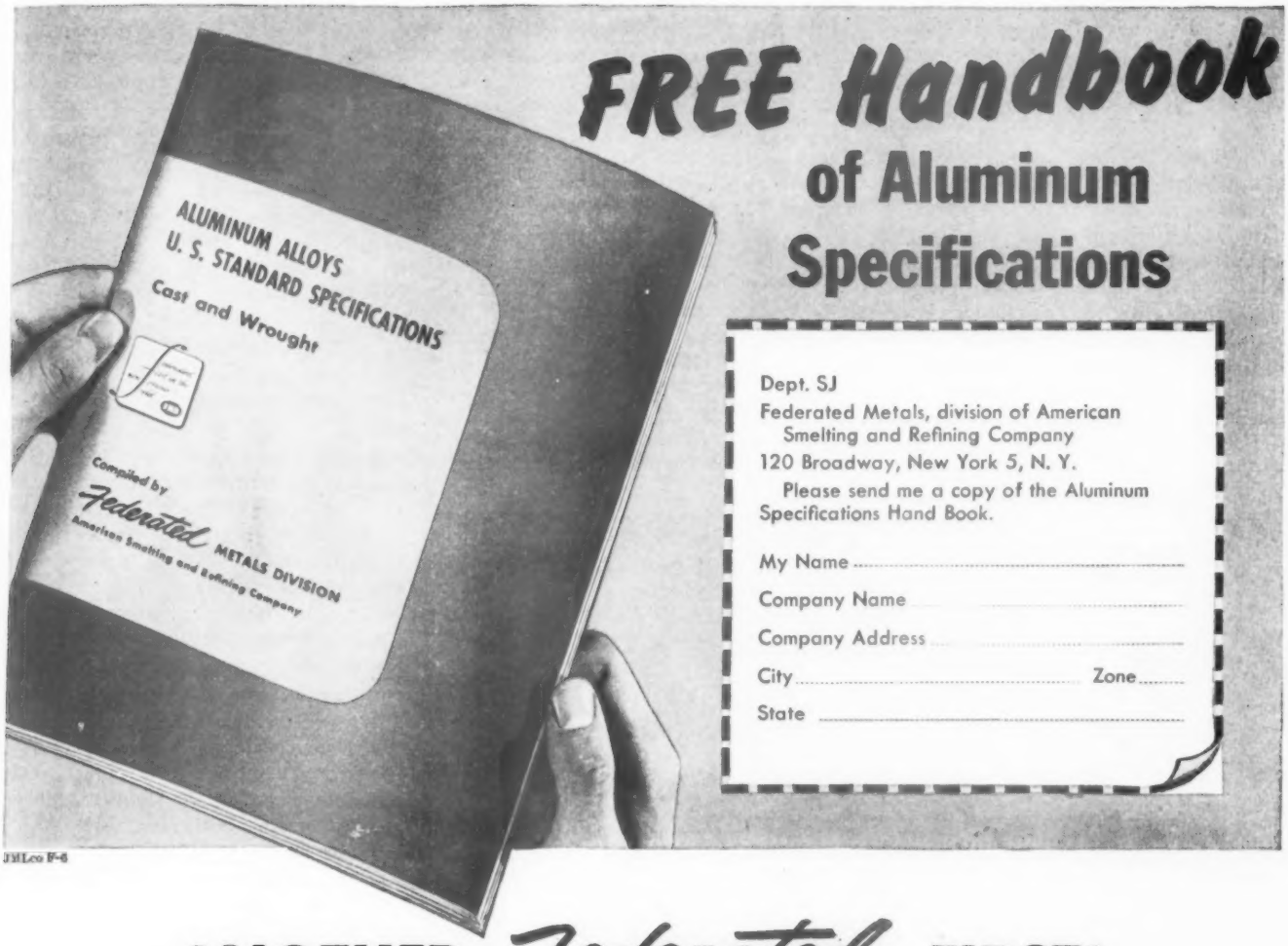

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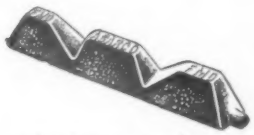

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(*Concluded from page* 228)

ablized and quenched, produced a malleable cast iron having tensile strength of approximately 125,000 psi, and a modulus of around 22,000,000.

In heat treating this material, graphite of small particle size was produced, which explains in a greater part the reason for the high strength, (Fig. 11). This material was chromium plated on the periphery which contacted the cylinder wall and the material itself did not have to bear the burden of wear resistance. When these rings were used without the chromium plate, the low wear resistance was apparent and it became necessary to develop this alloy further to improve its wear resisting properties. In order to enlarge the graphite size (Fig. 12), the prequench was eliminated and, in doing so, the strength of the alloy material was lowered to around 88,000 psi. Wear resisting properties were improved considerably, but in many cases where boundary lubrication of an engine occurred and the material, due to its drawn martensitic structure, apparently was still too harsh, scuffing would occur occasionally. Chemical and physical properties of the material were as follows:

Total C 2.85-3.50 per cent; Si 1.00-1.65 per cent; Mn 0.50-1.00 per cent; P. 0.40 per cent max; S 0.12 per cent max; Mo 0.35-0.65 per cent; Cu 0.35-0.65. Hardness, Rockwell C, 24-30; tensile strength 88,000 psi min; modulus of elasticity 20 × 10^6 psi min; Izod impact 10 in. lb min.

The next step was to remove the alloys entirely and, instead of oil quenching the material to produce a martensitic structure, it was cooled in air, thereby producing the large graphite with a coarse pearlitic matrix. The microstructures are shown in Figs. 13 and 14. The apparent difference is in the matrix of the material, and after numerous tests it was found that the coarse pearlite and the large graphite of the arrested pearlitic malleable material was satisfactory for piston rings, even in those cases where boundary lubrication occurred.

This material is electrically melted and each casting is weighed individually before pouring (Fig. 1). The material is cast in permanent molds (Fig. 15) and, with a carbon-silicon ratio of this material, it is cast white. The molds, which are held to a minimum temperature by water spraying, are coated with a minimum amount of mold dressing so as to avoid any insulating effect. Since the sleeves are cast white, it is necessary to heat treat them at 1750 F for several hours in an atmosphere furnace in order to bring about a partial malleablization (Fig. 16). After annealing, the heat treated castings are cooled at such a rate so as to produce a coarse pearlitic structure, as shown in Figs. 13 and 14.

Quenched Hardness Subject of Report

The recently published report, "Physical Properties as Influenced by As-Quenched Hardness," prepared by a group of the iron and steel technical committee of the Society of Automotive Engineers, indicates that a part must be hardened all the way through (getting complete transformation from austenite to martensite) to do the best possible job. Investigations reported in this new publication are based on tests with three different kinds of steel. The report (SP-53) is available from the SAE Publications Department, 29 West 39th St., New York 18, for $1 to SAE members and $2 to nonmembers.

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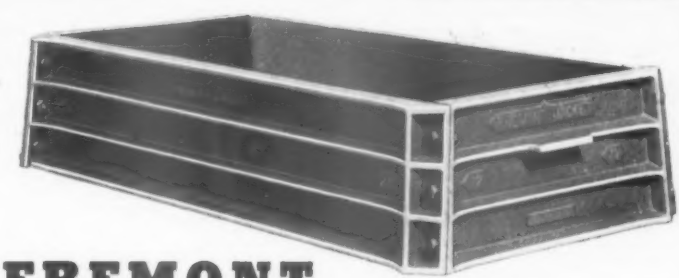

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FOUNDRY REDUCES MANUAL HANDLING

(*Continued from page* 93)

castings at a height of 22 ft above the ground (Fig. 11) and re-entering the foundry on the opposite side of the building. This conveyor serves three purposes. It gives the hot castings an opportunity to cool; it keeps the heat of the castings out of the building, and it conveys the castings to the sorting room.

Sorting is conducted on a mezzanine at the end of the cleaning department bay and adjacent to the cupolas. Gates and sprues are removed and weighed for delivery to the cupola charger over a ½-ton capacity automatic monorail system, while the castings are automatically discharged onto sorting tables. Sorted castings are dispatched to the cleaning room on the floor below either through chutes or in containers lowered by hoists. The cleaning room, equipped with tumbling barrels, centrifugal blast units and grinders, also has heat treating furnaces for use in stress relieving of castings. Approximately one-half the foundry's production on a tonnage basis is given such treatment, which invoives a 13-hour cycle with the work held at 1000° F for three hours. Lift trucks haul finished castings to the nearby machine shop.

Molding practice and equipment employed on the small casting line differ somewhat from those used on the motor housing line. Fig. 7 shows how the shallow aluminum flasks are available to the molder from a roller conveyor at waist-high level. Both the drag and cope are rammed simultaneously on a jolt-squeeze machine, the drag pattern being mounted at the front of the molding machine table. Sand is received from an overhead hopper and any spillage in filling the flasks or in the ramming drops through a floor grate to a conveyor belt.

Molding Operation Is Automatic

The molding operation is largely automatic. When the operator depresses a push button, as shown in Fig. 8, the machine jolts the cope and drag; the head swings into position and thereby scrapes off excess sand; the squeeze action occurs, followed by vibration and stripping of the pattern—all in one automatic sequenced cycle. In removing the drag from the machine the operator simultaneously rolls it over, this being accomplished easily with the aid of a spring hinge on the front of the machine table. The drag then is placed on a moveable table in front of a roller conveyor line, cores are set, and the mold is closed (Fig. 9).

It will be noted that the conveyor line is triple decked; the top deck is for flask return, the other two for outgoing molds. Individual air cylinders for each outgoing conveyor line push the molds away from the molder, relieving him of this operation and, at the same time, pushing a poured mold into the shakeout device located at the opposite end of the conveyor.

Triple decking the conveyor line not only conserves floor space, but it also provides flexibility in molding and pouring schedules since it permits accumulating a relatively large number of molds if hot metal is not immediately available. Flasks are clamped with an air-operated device of the type mentioned previously, and molds are poured from 500-lb capacity ladles suspended from a monorail and moved manually along the pouring line as shown in the illustration Fig. 10.

As new molds are placed on the line, poured molds are pushed to

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the shakeout position shown in Figs. 13, 14 and 15. This shakeout, developed by the company, may or may not have been suggested by a sand dump toy popular with small children, but its operation has a certain resemblance. The mold rolls into a basket (Fig. 13) supported on trunnions slightly off center. Weight of the mold turns the basket over with sufficient velocity (Fig. 14) so that, when the basket hits a stop, sand and castings are discharged through a hole in the floor onto an oscillating trough conveyor below. An air-actuated piston rod automatically raises the basket vertically (Fig. 15) to the top return conveyor, righting the basket as it does this and unloading the flask onto the gravity roller conveyor leading back to the molder. The basket then returns to position to receive the next mold.

It is apparent that the correct consistency of molding sand is required if the flasks are to be emptied completely and quickly by the method just described, particularly since barred drags are used. Experimentation developed a sand mixture with the desired collapsibility without sacrificing other necessary mold properties.

Sand Passes Over Magnetic Pulley

Sand separated from the castings at the large central shakeout below the floor is passed by a conveyor belt over a magnetic pulley to extract tramp iron. It is then carried by elevator to a vibrating screen for removal of cores and lumps, and subsequently is transferred by belt to a 250-ton capacity overhead storage bin above two mixers which also are located above the foundry floor. This sand is drawn on as required, mixed with new sand, clay and water, and discharged to a belt conveyor leading to an aerator. From the latter the sand is moved by belts to the various molding stations where it is plowed off into hoppers (Fig. 12).

Considering the volume of castings production, core requirements are relatively small. Cores are made largely on blowers and baked in rack type ovens. The coreroom also is equipped to prepare chills, a considerable quantity of which is required for various castings. These chills are coated with a proprietary rubber compound before use and in some cases are sprayed with fine silica sand after application of this base coating. Specially designed machines are employed to facilitate these operations.

The two cupolas supplying hot metal are 72 in. diameter lined to 45 in. They are used on alternate days. Located at the end of the pouring floor, the furnaces are tapped either directly into the pouring ladles or into a mixer for holding. Ladles usually are moved from the cupolas to the pouring line over the monorail system shown in Fig. 1, although metal required for miscellaneous work on the side bay is transported in ladles by a lift truck equipped with a crane arm.

Cupola charges are made up outside the foundry near the raw material storage area, a distant view of which is shown at the left in Fig. 11. This operation requires no special mention since future plans call for complete modernization of materials handling from their receipt to their eventual charging—all to be performed under cover.

Klinger-Dills Co., Dayton, O., has been appointed exclusive distributor of the belting division of the Russell Mfg. Co., Middletown, Conn., which produces conveyor and transmission belting and high-speed belts.

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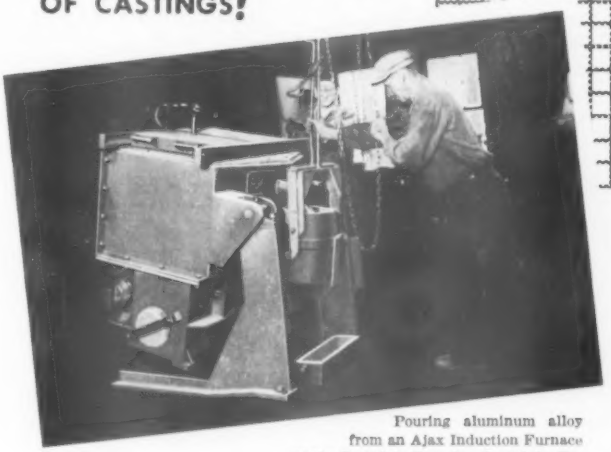

Pouring aluminum alloy from an Ajax Induction Furnace at the Scottdale Foundry, Scottdale, Pa.

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AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

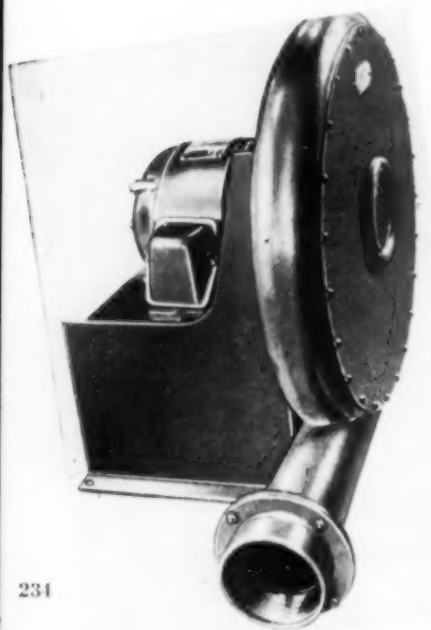
NEW Equipment AND Supplies

(1)—Blowers: Lindberg Engineering Co., Air and Hydraulic Division, 2444 West Hubbard St., Chicago 12 — Single-stage centrifugal blowers have full 360-degree positioning, a feature which is said to facilitate installation and adjustment and to eliminate pipe cutting, welding and extra piping. Belt-driven blowers in the new line have been designed to utilize a minimum amount of floor space.

(2)—Permeability Tester: Precision Scientific Co., 3737 West Cortland St., Chicago 47—Sand Permeability tester utilizes the time-pressure-volume method of measuring permeability. In making a test, time is measured for a definite volume of air at a fixed pressure to pass through a specimen of uniform size. Features of the unit include a rounded top bell to which condensation is said not to stick, thereby changing its weight; the bell moves vertically into the water tank on roller guides, which reduce friction; parts of the apparatus which come in contact with the water seal are made of corrosion resistant materials; permeability values are indicated directly on the instrument.

(3)—Bin Vibrators: Cleveland Vibrator Co., 2788 Clinton Ave., Cleveland 13—Pneumatically operated vibrators designed for installation on almost every type of hopper and storage bin deliver hammer-like blows to prevent arching-over and plugging of loose bulk materials in bins having capacities ranging from one to several hundred tons. The vibrators are suitable for either intermittent or continuous duty, and are available in six sizes which have piston diameters from 1¼ to 4 in. Extra large and heavy-duty models can be furnished upon request. Speeds of operation range from 2100 vibrations per minute on smallest model to 750 vibrations per minute on the largest model, when used on standard line pressure of 80 psi.

(4)—Magnetic Separators: Dings Magnetic Separator Co., 4708 West McGeogh Ave., Milwaukee 14—Portable, inclined belt type magnetic separator utilizes a permanent magnet pulley as head drive for the inclined belt, automatically effecting a sharp separation of magnetic and nonmagnetic material at the discharge end of the conveyor. Magnetic pulley is said to be weatherproof and magnetic permanence is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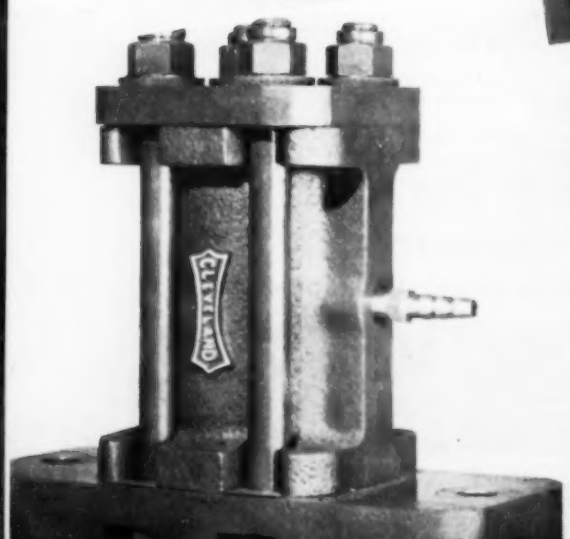

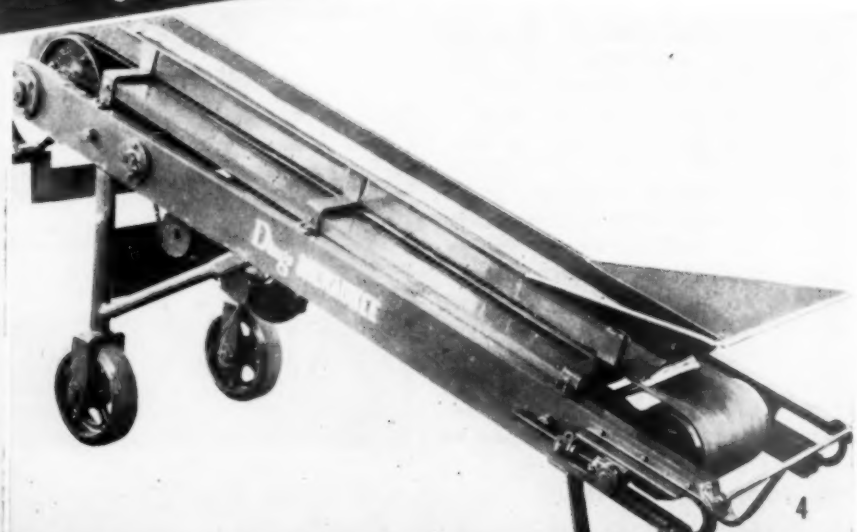
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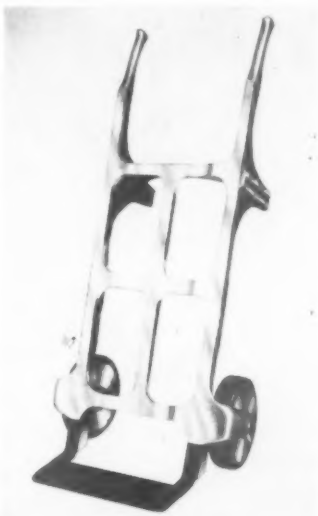
guaranteed for the life of the separator. The unit is provided with a motor drive for belt conveyor. Forward end of the inclined conveyor is supported by a steel frame mounted on two wide-faced steel wheels. Lower end rests on the ground on a steel skid at a height of 24 in. Standard separators are available in lengths of 7 or 10 ft with belt widths of 12, 14, 16, 18, 20 or 24 in. Capacities range from 40 to 80 tons of sand per day.

Cab Air Conditioner: Lintern Corp., 64 Lincoln Ave., Berea, O.—New crane cab air conditioner is designed to permit mounting of the condenser unit at any convenient place on the crane and the evaporator, or cooling blast coil, in the cab. The two units are connected with refrigerant lines properly secured and protected against line breakage by vibrator eliminators. The condenser unit is the same that has been used in previous models. The separate air filter unit includes screen type and activated carbon filters together with electric heater for winter. The evaporator which rests on top of the air filter unit is said to take little space in the cab.

Fork Trucks: Automatic Transportation Co., 149 West 87th St., Chicago—Lightweight electric fork lift truck is made in 1000 and 1500-lb capacities. The thousand-pounder, designed for a 30-in. load,

weighs 2360 lb, and when rated for a 48-in. load, weighs 2623 lb. The 1500-lb model's weight is 2836 lb. Despite a collapsed height of 78 in., both models lift to 134 in., with free lift of 68 in. before the telescopic mechanism is extended. It is claimed that with a 30-in. load, the trucks can stack at right angles in an 8-ft aisle, and a 48-in. load requires a 10-ft wide aisle. The trucks have a permanent 2½-degree tilt at the centering point, retracting the load over the wheels. Tilt while lifting is 10 degrees backward and 5 degrees forward. Features include automotive type controls, controlled caster-type wheel steer, high pressure hydraulic lift with twin ram mechanism, dead man control and simultaneous drive, lift and tilt.

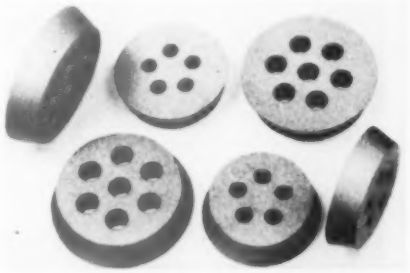
Hand Truck: Aerol Co., 2820 Ontario St., Burbank, Calif.—Hand truck frame is a one-piece aluminum alloy casting designed to provide good stability under heavy loads. It



is said to be corrosion resistant and rust-proof and can be made spark-proof. Aluminum alloy wheels are equipped with tapered roller bearings, factory-packed with special waterproof lubricant. They are said to require no additional greasing during the normal life of the truck. Wheels also are equipped with solid rubber tires guaranteed not to separate from the wheel cores, and the rubber tread is oil and water resistant.

Paint: Wilbur & Williams Co., Greenleaf & Leon Sts., Boston 15—Combination chemical pretreatment and primer for metal is said to eliminate the necessity of having to remove all rust or to have the surface perfectly dry before painting. It is a vinyl base, quick drying wet primer intended for application over wet or dry, clean or rusted metal including steel, aluminum or galvanizing. Its purpose is to provide a hard, paintable foundation for any type of paint, including ship-bottom paints.

Strainer Cores: American Lava Corp., Manufacturers Rd., Chattanooga 5, Tenn.—Strainer cores are made from a material said not to be affected by heat shock at normal molten metal temperatures encountered in foundries. They are unaffected by pouring, will not disintegrate or contaminate the casting, it is claimed. After the pouring, the strainer cores remain in the gate



portion and the cores are fluxed away in subsequent remelting of foundry scrap. The strainers have flat surfaces, and because they are custom made, are available for almost any requirement.

Hoists: David Round & Son, Broadway & Henry St., Cleveland 5—Lightweight, portable, heavy duty hoists have simplified hoisting mechanism, employing only two gears. An outer gear is connected to the load sheave and an inner gear is of the actuated floating type. Each pull on the hand chain causes the cam shaft to revolve, actuating the floating inner gear, which moves eccentrically over the inner circumference of the outer gear. Held in one position relatively by eight hardened steel balls, it cannot rotate; it thus compels movement of the outer gear and load sheave. Gears are special alloy steel, cut, hardened and ground. Hoist cover is drop forged from chrome manganese high tensile steel. Hoists are offered in 16 standard models of ½ to 40 tons capacity.

Densified Wood: Parkwood Corp., 24 Water St., Wakefield, Mass.—Densified wood, known as Hi-Den, is made from selected wood veneers, impregnated in phenolic resin and compressed under high pressure to approximately half the original thickness. The result is a material said to have the following characteristics: Greater strength than equal weight of any metal, low coefficient of friction, high resistance to abrasion, high resistance to moisture, toughness—high impact strength dimensional stability, and adaptability; it can be fabricated with woodworking equipment. It finds application in the foundry trade for patterns,

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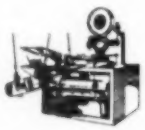

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mold and match boards and core-boxes. It is made in 30 x 48-in. panels, ranging in thickness from ⅛ to 2 in. Where thicker sections are required, the material can be built up with resorcinol type glues and normal gluing pressures.

Dust Hood: General Scientific Equipment Co., 2700 West Huntingdon St., Philadelphia 32—Loose-fitting, fabric dust hood weighs 5 ounces and provides ample visibility through a clear plastic window. The

fabric, supported by a head frame, covers and protects the face, head, and neck down to the shoulders. Protection is offered against irritating and nuisance dusts or sprays. Hood may be worn with goggles or respirator.

Core Oil: E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33—Newly developed general purpose core oil is said to possess uniformity of performance under practically all foundry conditions, for all types of cores. It permits the thickest part of an intricately shaped core to be as thoroughly baked as its thinnest sections, and in turn permits the thinnest fin section to be as strong and serviceable as the heavy sections, it is claimed. Its use is said to lower baking time and give good cores at low baking temperatures.

Propeller Fans: Chicago Blower Corp., 4558 West Congress St., Chicago 24—New propeller fans are designed for heavy duty applications—air cooling, man cooling, exhausting of fumes, smoke, gases, dust, etc. The airfoil section type blades have been designed to have a nonoverloading power characteristic. This means that at a given operating speed the brake horsepower will remain nearly constant, from a free air delivery to a completely blocked-off condition. The airfoil blades are of the adjustable pitch type, with all diameters from 14 to 48 in. adjustable to any pitch required. Blades and hubs are separate castings made of aluminum alloy accurately machined and matched. In case of damage, any one of the individual parts may be purchased, making it unnecessary to buy a new blade. Fans are equipped with any type electric motor to meet specified conditions.

Electrode: Eutectic Welding Alloys Corp., 40 Worth St., New York 13, Dept. K—Larger diameter (¼-in.) electrode has been developed to handle heavy cast iron castings. It also is available in 3/32, 1/8, 5/32 and 3/16-in. diameters for all types of cold cast iron welding, requiring no preheating or dismantling of equipment. Designed for use with alternating or direct current machines, the electrode is said to have a uniform burn-off rate, to flow out rapidly and to produce welds with tensile strength of 50,000 psi and brinell of 150-200.

Tool Balancer: Keller Tool Co., 1333 Fulton St., Grand Haven, Mich.—Portable tool balancer suspends tools weighing up to 10 lb near the working area for instant use. It is said to be adjustable to all tool types, remaining vertical under all operating conditions. It has a working range of 6 ft. It is claimed that little effort is required

to bring tools to the job. At completion of the operation, tool is released and returns to its preadjusted position near the work area. Adjustments of the "up" position are made by moving a clamp and rubber bumper up or down on the balancer's wire rope. Cable tension is

(*Continued on page* 238)

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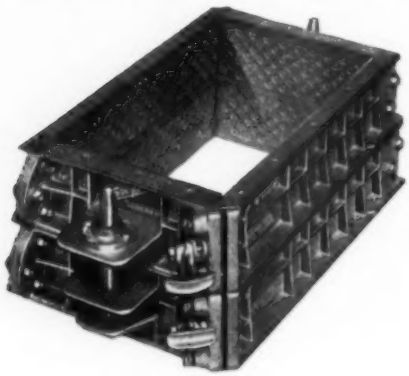

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(*Continued from page* 236)

regulated with nut and lock. Housing of the 5¾-lb balancer is aluminum with clock-type suspension spring mounted on oilless bearings.

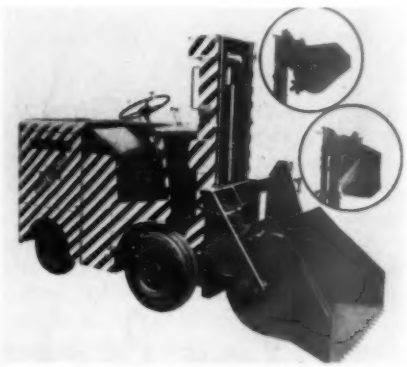
Gate Strips: Key Co., Box 494, East St. Louis, Ill. — Flexible strip material is designed to perform the duty of gate and runner strips on pattern boards. It can be applied to

bottom board or to pattern board in any desired curve, simply by nailing in place. Material hardness is said to be sufficient to withstand the ramming of sand. Strips are available in half-round sizes of 1½, 1¾, 2 and 2¼ in.

Muffle Furnaces: Cooley Electric Mfg. Corp., 38 South Shelby St., Indianapolis 7 — Laboratory muffle furnaces are designed for a complete overall temperature range from 300 to 2000° F. Temperature control over the complete range is provided by a selective power modifier which is a synchronous motor-driven variable cam operating an "on" and "off" switch once each minute. It is said that power input

from 5 per cent to full power may be obtained with control obtainable from about 300° F to furnace maximum. Temperature uniformity of +5° to −0° F is maintained by the power modifier used in conjunction with an indicating-controlling pyrometer. Furnaces use a power input of 4 kw at 230 v. They are offered in five models operating at maximum temperatures of 1750 to 2000° F with inside dimensions varying from 4 x 3 x 8 in. to 10 x 6 x 18 in.

Scoop: Crescent Truck Co., 1035 Willow St., Lebanon, Pa.—Electric fork trucks are being equipped with pneumatic tires and an automatic self-loading scoop in capacities up to 15 cu ft. Scoop is designed to load itself automatically without the use of hydraulic cylinders or other auxiliary power when driven into a pile of loose material. It is said to self-load to 100 per cent of capacity in loose materials and as much as 60 per cent in ceramic clay of high moisture content. Loads are released at any predetermined height by a fixed trigger or at any height

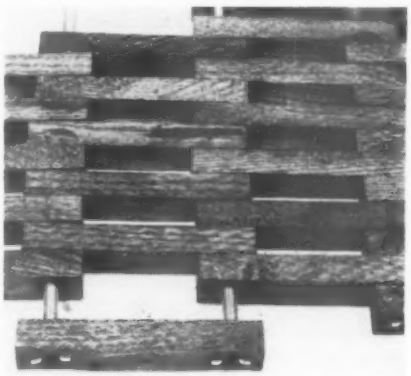


within the lifting range of the truck by a manually operated lever. A hydraulic self-actuating cylinder and metering valve provide for dumping at any desired speed. Scoop is mounted on a standard carriage plate and is said to be easily interchangeable with standard forks.

Cutting Blowpipe: Linde Air Products Co., Unit of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17—New cutting blowpipe is designed for extra heavy cutting operations such as the scrap cutting of skulls and buttons. Cutting of steel over 6 ft thick has been reported. With its powder cutting attachment, the blowpipe is said to be suited to cutting scrap having more than a normal amount of cinder and slag inclusions. It is a mixer type blowpipe using a heating blowpipe for mixing of preheat gases. Medium pressure acetylene supplied from an acetylene generator or from manifolded cylinders is used. The tool has no valves, and its simplicity permits easy maintenance and replacement of

parts, it is claimed. It is equipped with swaged nozzles of pure copper with extra heavy chromium plating.

Floor Mats: Hough Shade Corp., Janesville, Wis.—Floor mats are constructed of small wood blocks, each ⅝ x ¾ x 4½ in., arranged in an openwork checkerboard pattern, and held together by coil spring fasten-



ers. Wood links are of ash and the coil spring fasteners are of galvanized steel. Fasteners have sufficient spring tension to hold the mat together firmly, yet are flexible enough to permit normal expansion or contraction of the links due to moisture absorption or drying. The springs allow the mats to conform to rough or uneven floors without creating points of strain in the mat. Three sizes of mats are offered, the smallest being 23¾ x 37 in. and the largest, 30 x 72 in.

Recorder: Bristol Co., Waterbury 91, Conn.—Instrument for recording time-in-process gives a reading on a uniform scale and chart of

rate of conveyor movement, directly in terms of the total time consumed by work in traveling through a process. The instrument is intended for use on such equipment as continuous furnaces for metal annealing, tempering, and hardening, and for

13 years of cast-iron service

•

IMPERIAL BELTING SPECIFIED AGAIN

In 1925, a nationally-known* malleable iron company installed 527′ of 30″, 6-ply Imperial REXALL on a castings conveyor. For 13 years it stood the abrasion and impact of rough castings . . . some so heavy they had to be removed by chain hoist. Replacement was another Imperial REXALL belt, pictured here, now in its tenth year of this terrific service.

Imperial Belts are made of tightly woven 37½ ounce silver duck, Inner-Locked stitched to prevent ply separation, and specially impregnated for the service required. If you are interested in tougher belting, write for Folder 14-A.

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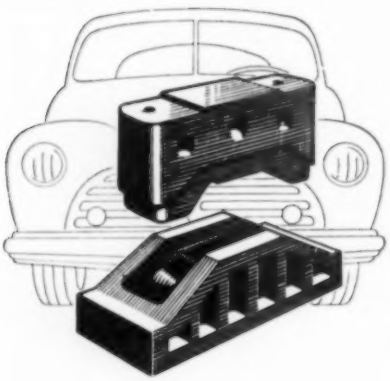

cast-to-form dies

Easy machinability compared with steel, capacity to take a high polish in work, toughness to resist pressing stresses, and above all ability to resist abrasion—these qualities denote a good forming die.

The use of Molybdenum in cast iron dies has now become standard practice, because it most economically attains these desirable properties.

One of the suitable compositions is: 3.40% Total Carbon, 1.40% Silicon, 0.80% Manganese, with 0.25% Chromium, 0.10% Vanadium and 0.50% Molybdenum added.

This composition is one of many listings under "Dies" in our "Applications of Molybdenum Cast Irons"—an alphabetically arranged ready-reference booklet for busy foundrymen and for engineers—write for it!

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use on such equipment as continuous furnaces for metal annealing, tempering, and hardening and for continuous drying and baking ovens.

Protective Caps: Wheeler Protective Apparel Inc., 224 West Huron St., Chicago 10 — Protective caps are made of featherweight asbestos, flame-proof cloth, leather or

wool and incorporate two safety features—all feld seams (no exposed threads) and a long visor to shield the eyes and face. The caps are available in sizes 6¾, 7, 7¼, 7½ and 7¾ in. Ear flaps which fold up into the cap when not in use may be had on request. Cloth caps come in white, dark green, blue or brown.

Air Backstand: Hammond Machinery Builders Inc., 1600 Douglas Ave., Kalamazoo 54F, Mich., Dept. GP-37—Air backstand, designed for heavy production grinding or polishing with abrasive belts, has

an air-actuated cylinder which automatically maintains correct belt tension, compensating immediately for a fraction of an inch of belt stretch. Different materials require different belt tension, and the operator sets a pressure regulator valve to provide the correct tension for the various materials. Backstand is constructed of cast iron except for the stainless steel 12-in. diam, 7-in. face idler pulley. The pulley is diametrically balanced and runs on sealed ball bearings.

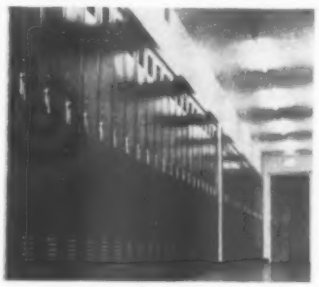
Truck Attachment: Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 14—Attachment for 4000-lb capacity lift truck is designed to be converted from fork to boom in a few minutes without using special tools. Either device may be used independently or simultaneously where jobs require extra security in handling. The attachment consists of a base member which is attached to the truck's lifting mechanism, the fork tines suspended from a bar supported on the base, and the boom. The latter is a solid, alloy steel, heat treated bar bent at right angles near the middle of its length. That part which engages the base is machined for a sliding fit into brackets and a base socket where it is held vertically and firmly in place. When forks are to be used alone the boom is detached by slipping it out of its holder. When boom is required by itself the fork tines are swung upward and backward and held in this reversed position by pins in the brackets at top of the back base. Boom extends 36 in. horizontally from base, and fork tines are 36 in. long. Maximum boom lift from floor is from 30 to 145 in. Fork lift is 117 in.

Suction Tube: Torit Mfg. Co., 303 Walnut St., St. Paul 2—Suction tube assembly for connecting the company's self-contained dust collectors to wheels on surface grinders, tool and cutter grinders, and other machines that cannot be hooded properly are made in 3 x 4 in. sizes to fit standard inlet holes. Assemblies have duck-covered hose and a holding framework which follows closely the curve of the tubing. The new assembly is designed to permit placing of the nozzle directly in the dust stream with a minimum of interference to working operations. They may be fitted with either vertical or angular type nozzles.

Crane Clutch: American Hoist & Derrick Co., 63 South Robert St., St. Paul 1—Outside band clutch for locomotive cranes utilizes a new feature which is said to keep the band perfectly round, enabling its full surface to contact the drum. This has been done by using a double tandem clutch, which consists of two half bands rather than one full band. Each half band is actuated by a separate

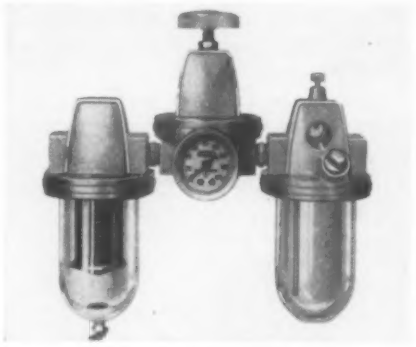
air cylinder, both being controlled by a single valve. With these half bands it is said to be a simple matter to hold proper shape during installation and keep the entire band surface in contact with the drum, thus avoiding high spots and jerky operation.

Lockers: Lyon Metal Products Inc., 1932 Montgomery St., Aurora, Ill.—Framework and doors of lock-



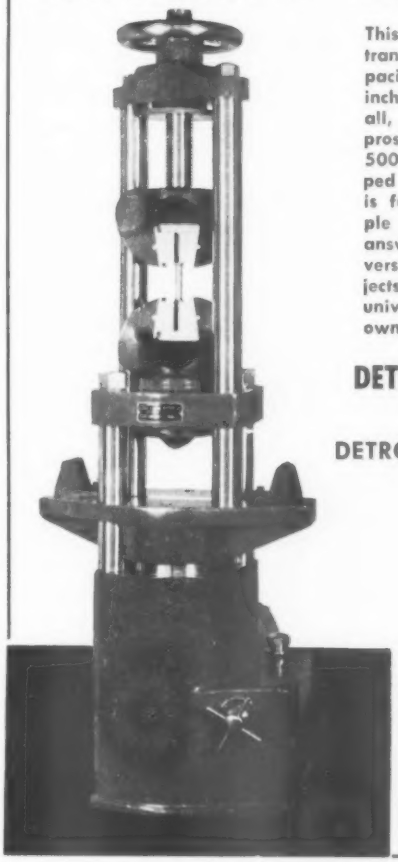
ers are made of steel and all other parts are of steel reinforced Masonite. Steel parts are finished in green enamel and the Masonite is used in its natural brown color. Lockers have recessed satin chrome handles into which are fitted number plates. The lockers are made in both single and double tiers, and are available with steel sloping tops and closed bases. They also may be obtained without legs for recessing.

Conditioning Unit: Hannifin Corp., 1101 South Kilbourn Ave., Chicago 24—Compressed air conditioning unit, consisting of air filter, pressure regulator and lubricator, is designed to clean and purify the air, automatically control its pressure and then add atomized oil for inter-



nal lubrication of moving parts in air powered equipment. Filter is said to provide continuous micronic edge filtration of dirt, scale, and abrasive impurities as small as 50 microns (0.002-in.) It also embodies a whirlwind baffle action designed to eliminate moisture and emulsified oil from the air. The pressure regulator has a "free floating" valve stem that offers protection against acci-

UNIVERSAL TESTING MACHINE



This is a very practical machine for tensile, transverse and compression testing. Its capacity, equivalent to 150,000 lbs. per square inch, on a standard .505 specimen. Best of all, it is priced within reach of the average prospective user. It weighs approximately 500 lbs., stands 4 feet 4 inches, comes equipped with gauges, grips, blocks and motor, is fully automatic, and is exceptionally simple to operate. If you want quick, accurate answers to questions concerning tensile, transverse and compression qualities of metal objects, just invest in this compact, practical universal testing machine. It will pay its own way in the saving of laboratory fees.

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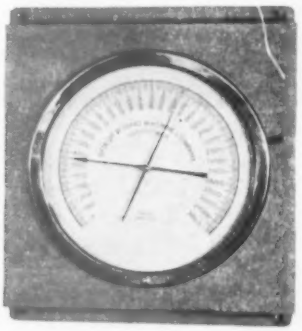

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Speed production as much as 400% . . . cut costs 75% . . . with this compound that converts loose and metal-gated patterns into match-plate production. Good for thousands of impressions!

dental presure build-up and permits reducing pressure without exhausting the control valve. The lubricator is suitable for use on primary air pressures up to 150 psi. Rate of oil flow can be controlled accurately by a needle valve.

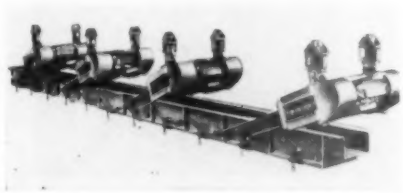
Goggle: Watchemoket Optical Co., 232 West Exchange St., Providence, R. I.—Spectacle type goggle is designed to afford the wearer 92 to 96 per cent protection. This is accomplished with semicup lens design that provides full protection at sides and bottom, leaving a narrow open-

ing only at the brow to eliminate fogging. Lenses are shatterproof plastic and are available in clear, or light, medium or dark green. Frame is plastic with lenses locked in deep channels so they can't fall out, yet can be replaced quickly, it is claimed. Entire goggle weighs less than $\frac{5}{8}$-oz. Metal temples telescope to fit any head size.

Gas Firing Unit: Eclipse Fuel Engineering Co., 725 South Main St., Rockford, Ill.—Complete gas combustion assembly for automatic firing of many different types of heating equipment comes as a "package" unit, comprising the blower, burner, mixer, safety equipment, valves, regulator, piping and wiring. Unit is said to be entirely automatic, after gas and electric supply have been turned on. Installation consists of setting the unit in place, connecting the gas supply and plugging in electrical connections. Burner is equipped with an electronic type, flame failure unit which closes the main solenoid valve instantly in event of pilot flame failure.

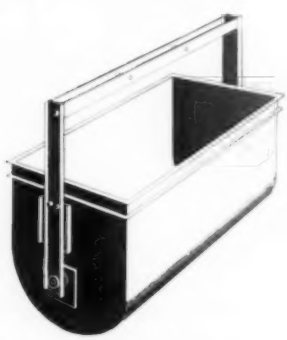
Diaphragm Valve: General Controls Co., 801 Allen Ave., Glendale 1, Calif.—Diaphragm gas valve is designed for reliable control of natural, manufactured, mixed and liquefied petroleum gases to space and unit heaters, central, floor and wall furnaces and boilers. Valve is of packless construction and all body parts are die formed aluminum of high density and tensile strength. It is offered in two small sizes, $\frac{3}{8}$ and $\frac{1}{2}$-in. pipe size; two medium sizes, $\frac{1}{2}$ and $\frac{3}{4}$-in., and three large sizes, 1, $1\frac{1}{4}$ and $1\frac{1}{2}$-in. Also available are a standard model and a manual opening model with or without electric trip. Valve has low current consumption of 5 w, for low or line voltage applications.

Vibratory Conveyors: Syntron Co., 540 Lexington, Homer City, Pa.—Vibratory conveyors are offered in various lengths and capacities, for



suspension or base mounting, and powered by one or more vibratory motors mounted either above or below the trough, depending upon available room. They are said to be particularly adapted to the handling of hot, abrasive materials. Movement of the trough is confined to the spring system of the vibratory motor, and a dial switch provides variable control of the rate of material flow. The unit illustrated is a heavy tonnage suspension type with an open flat pan trough, 20 ft long, and is one of four units making up a combined length of 80 ft. The conveyors are available with sealed, tubular troughs to convey dusty or poisonous materials.

Buckets: Cleveland Beacon Products Co., 1930 West 77th St., Cleveland 2—Rollover, side chute and hopper type buckets have been de-



signed to provide a range of standard sizes and shapes to meet almost every requirement. They are of all-welded construction, easy and safe to operate and require a minimum of headroom when used in conjunction with overhead equipment. Casters or wheels can be incorporated for efficient floor movement.

Mechanical handling in your yard pays too— with ROUSTABOUT CRANES

The fast tractor-footed load-hustlers

● Don't hang on to the old-fashioned idea that mechanical handling pays off only when it follows prescribed routes and methods — inside your foundry. Free a Roustabout Crane in your yard — let it shift, stack, load, unload — where you want it, when you want it. You'll hit pay dirt in increased man hour savings —and speedy, efficient *action*. Single line "hook-on" type bucket for sand, coal and coke; magnet for scrap or castings. Loads to 7½ tons, wheel or crawler tractors. Make your yard contribute to profits, too — get the Roustabout economy facts now.

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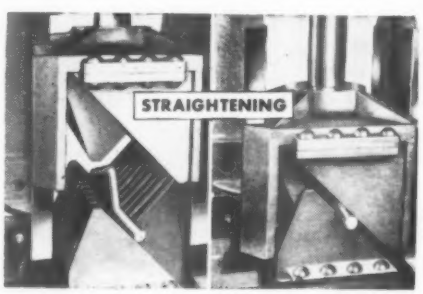
. . . and Form Gaggers, too

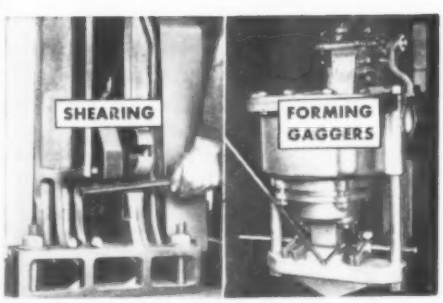
If core rod costs are a problem because of costly hand straightening or excessive purchases of new stock, the Core Rod Straightener will return you a nice profit.

A Chicago foundry, for example, saved 50% on the purchase of new materials and by replacing costly hand-straightening saved over 2,000 hours yearly. In shops where the machine is used the scrap pile is a thing of the past . . . labor and material costs go down . . . and the savings are sufficient to quickly return the investment.

No specialized talent is needed to operate the machine. Anyone can do it after a few simple instructions. It operates as fast as material can be fed into it. Rods can be cut to size quickly and accurately. An attachment for making gaggers is optional.

Available in 4 sizes for every need. *For complete information write for Bulletin 10-A.*





American CORE ROD STRAIGHTENER

AMERICAN WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St. Mishawaka 2, Indiana

USE OF CELLULOSE MATERIALS IN FOUNDRY SANDS

(*Continued from page* 84)

washes and dirt. Of the materials tested, corn cob flour is the only one to show maximum resistance to rat-tailing and buckling, plus a desirable moderate increase in hot strength at higher temperature.

Gas Volume. One of the disadvantages of any organic material in sand is the possibility of increasing the gas content and thereby promoting either gas defects or poor working conditions. Fig. 3 illustrates the fact that each material tested had a different effect on gas evolution. The corn cob flour and hydrolyzed wood flour showed the lowest increase in volume of gas produced. Tree bark flours showed the largest increase in gas volume.

Weight of Materials. The last column of Table I indicates the weight per cubic foot of the materials tested. Since the additions were made on the basis of 1 per cent by weight, the volume additions varied to some extent. These flours are sold on a weight basis. Therefore, additions to the muller should be calculated on a weight rather than volume basis. This is particularly true when comparing one material with another.

Effect of Cellulose Materials in Core Sand.—Wood flour is added to core sand mixtures to control collapsibility. For this purpose it is extremely effective in spite of the fact that it reduces the baked strength and hardness. Table II shows the relative effect of the materials tested on such properties such as flowability, green compression, baked permeability, baked tensile strength, collapsibility and gas evolution. In each case the flour addition was 2 per cent, with the exception of one test made using a 1 per cent addition of corn cob flour. This test was made when it became evident that corn cob flour was approximately twice as effective as other materials on the rate of collapse.

Of the properties tested, the most important are collapsibility and the core-gas volume. Fig. 4 illustrates the relative effectiveness of cellulose materials for improving collapsibility. It is immediately apparent that, of the materials tested, the most effective is corn cob flour, while the least effective is hydrolyzed wood flour. The effectiveness of corn cob flour is further illustrated by the fact that a

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● Speed plus safety is a reality with the improved CESCO No. 602 HEALTHGUARD ABRASIVE MASK. It means easier operation for workmen, with fewer breathing spells on all types of abrasive blasting. It assures positive protection against dust, sand and shot—regardless of density or length of exposure—encountered in foundries and steel mills.

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● NEW DURATEX HOOD protects head, neck and shoulders from abrasives.

Side view showing one-way outlet exhaust

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Pennsylvania

1 per cent addition gave a collapsibility rate directly comparable to a 2 per cent addition of most other flours and actually superior to a 2 per cent addition of regular wood flour or hydrolyzed wood flour.

Fig. 4 further illustrates the fallacy of the theory that the collapsibility effect of cellulose materials can be explained on the basis that these materials burn out and leave void spaces. Corn cob flour and hydrolyzed wood flour both have approximately the same specific gravity or weight per cubic foot. Therefore, a 2 per cent addition of either will provide essentially the same volume of voids. In spite of the fact that the void volumes are equal, the corn cob flour improves collapsibility by approxmately 96 per cent, as compared with 49 per cent for hydrolyzed wood flour.

Fig. 5 illustrates the effect of these materials on gas evolution of oil sand cores. Corn cob flour provided a decrease in the gas content per gram of sand. Other materials tested increased the gas evolution up to approximately 50 per cent.

To summarize the situation on cellulose materials, the following conclusions can be drawn from these tests:

Molding Sand—

1. All cellulose additions decreased permeability.

2. Most cellulose materials increased deformation with a maximum in the case of rice hull and corn cob flour and a minimum for regular wood flour.

3. Regular wood flour and hydrolyzed wood flour having high lignin contents increased the green compression strength of sand. Other cellulse materials had essentially no effect.

4. All cellulose materials increased the amount of temper water required.

5. All cellulose materials decreased the hot strength at 1000° F and, therefore, should have a desirable effect on rat-tails, buckles and scabs. The amount of such reduction in hot strength ranged from 60 per cent for corn cob flour to as low as 22 per cent for rice hull flour.

6. Most cellulose materials decreased the hot strength at 2000° F and, therefore, could lead to cuts, washes and dirt. The exceptions are corn cob flour and sugar maple flour. Corn cob flour showed a moderate increase while sugar maple flour increased the hot strength at 2000° F by almost 100 per cent.

7. All cellulose materials tested *increased* expansion at 1500° F.

8. All cellulose materials tested increased the amount of gas produced in the mold from 37 per cent (for corn cob flour) to as high as 105 per cent (for tree bark flour).

9. Corn cob flour was the only material tested to show maximum improvement in deformation, maximum reduction in hot strength of 1000° F and a moderate increase in hot strength at 2000° F.

Oil Sand Cores—

1. All cellulose materials showed a minor increase in green compression strength.

2. All cellulose materials showed a drastic reduction in tensile strength.

3. Corn cob flour increased the baked permeability while other cellulose materials had essentially no effect.

4. Most of the materials tested had essentially no effect on the blowability test except hydrolyzed wood flour, which showed a definite reduction in blowability, and corn cob flour, which showed a definite increase in blowability.

5. All cellulose materials sharply increased the collapsibility at 1500° F. The most drastic improvement in collapsibility was found for corn cob flour, which was approximately twice as effective as other materials.

6. All of the cellulose materials tested, with the exception of corn cob flour, gave some increase in the amount of gas.

7. All cellulose materials tested decreased core hardness.

It is apparent that wood flours and "wood flour substitutes" are not universally interchangeable. They should be chosen carefully for the specific

TABLE II—Effect on Properties of Core Sand Mixtures

Mixture Number*	1	2	3	4	5	6	7
AFA Test Sand—g	1935	1935	1935	1935	1935	1935	1945
Linseed Oil—g	25	25	25	25	25	25	25
Water—ml	40	40	40	40	40	40	100
Blowability—per cent	52	40	61	48	21	86	46
Green Comp.—Lb	.15	.5	.3	.25	.45	.1	.3
Baked Permeability	230	200	215	240	198	350	288
Baked Tensile—lb 1 hr. @ 425° F	241	80	81	87	91	40	78
Collapsibility—sec 1500° F, 50 lb Load	65	20	12	14	33	3	19
Core Gas Volume, 2500° F, cc/gm	27	41	38	39	42	25	22

* Mixture identification: 1—Standard mix—no wood flour. 2—Regular wood flour—40 g. 3—Sugar maple flour—40 g. 4—Furfural residue—40 g. 5—Hydrolyzed wood flour—40 g. 6—Corn cob flour—40 g. 7—Corn cob flour—20 g.

requirements of the type of work being produced, in addition to the usual criterion of value per dollar.

ANNUAL MEETING HELD BY STEEL FOUNDERS' SOCIETY

(*Continued from page* 87)

He stressed the importance of some of the society's research reports in the successful selling of steel castings.

A. J. McDonald, vice president, American Steel Foundries, Chicago, and chairman of the Product Development Committee, presented an exceptionally well prepared analysis of the problem of improving the quality of steel castings and increasing their use. He indicated that responsibility for quality improvement rests jointly with management, the sales force and the operating personnel. He also outlined the need of developing quality standards for steel castings. Definite committee recommendations were made for consideration by the industry.

Warden F. Wilson, general sales manager, Lebanon Steel Foundry, Lebanon, Pa., and chairman of the Advertising Committee of the society, unveiled an illuminated display cabinet designed to be shown on a rotating schedule at the principal engineering schools of the country. The cabinet, which stresses the importance of steel castings as engineering materials in the building of a number of well known products, also may be purchased by society members.

The Wednesday luncheon featured the presentation of the Lorenz medal to F. Kermit Donaldson and the T & O medal to Roy A. Gezelius, assistant works manager, General Steel Castings Corp., Eddystone, Pa., for their contributions to the work of the society and the progress of the steel castings industry. Congressman Clare E. Hoffman told the steel foundrymen of "Legislative Prospects for 1949."

At the opening of the afternoon session, the following outstanding safety records for 1948 were announced: Perfect records with no lost-time injuries — Deemer Steel Casting Co., Newcastle, Del.; Berkley Machine Works & Foundry Co., Norfolk, Va. (three years); Tonawanda Electric Steel Castings Corp., North Tonawanda, N. Y.; Hughes Tool Co., Houston, Tex.; and Brewster Co., Shreveport, La.

Cumulative lost-time injury frequency rate of less than 10 included

8¢ per TON IS HANDLING COST REPORTED BY A FOUNDRY USER OF *KRANE KAR*

A Midwestern foundry reports, "*KRANE KAR* can unload 50 to 55 tons of pig iron and malleable steel in 3 hours." Steps up unloading from gondola cars into storage piles and bins, and loading of scale cars and charging buckets. Magnet also handles skullcrackers. *KRANE KAR* may be operated by any man. Ask our nearest agent how to prune your materials-handling cost for modern, economical foundry operation. Ask for our New Bulletin No. 69.

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the following companies: 2.0, Carnegie Illinois Steel Corp., Johnstown, Pa.; 2.3, Bethlehem Steel Co., Bethlehem, Pa.; 3.1, General Steel Castings Corp., Granite City, Ill.; 4.3, General Steel Castings Corp., Eddystone, Pa.; 4.9, Chapman Valve Mfg. Co., Indian Orchard, Mass.; 6.3, Lunkenheimer Co., Cincinnati; 7.2, Pacific Steel Casting Co., Berkeley, Calif.; 8.8, Bethlehem Steel Co., Steelton, Pa.; 8.9, Mackintosh-Hemphill Co., Pittsburgh; 9.3, American Steel Foundries, Granite City, Ill. A definite improvement in the safety record of the industry was reported.

Clyde H. Wyman, chief metallurgist, Burnside Steel Foundry Co., Chicago, was awarded the prize for the best article published in *Steel Foundry Facts* during the year.

In speaking on the "Scrap Program for 1949," Edwin C. Barringer, executive secretary, Institute of Scrap Iron & Steel, Washington, stated that short of war, any crisis in scrap is definitely past. He stressed the fact that consumers as well as dealers have a stake in stabilizing the scrap market at an economic level. It is the object of the scrap industry to provide its customers with well prepared scrap at a price in line with the general commodity level. Any continued abstinence of consumers from the market or undue pressure to depress the price can only result in drying up the important sources and lead to a rebound which would benefit nobody.

Jack Claussen, American Iron & Steel Institute, New York, discussed the "Pig Iron Outlook for 1949." Mr. Claussen indicated that the number of blast furnaces that required repairs during the past year was greater than expected, and that difficulties in connection with a satisfactory supply of coke were great. Shipments of all grades of pig iron in 1948 totaled 7,169,000 tons as compared with 7,496,000 tons in 1947. The present year started with a substantial increase in blast furnace capacity and this betterment should continue. Iron ore is in better supply and considerable improvement is noted in quality of coke. Mr. Claussen concluded that with increased production capacity, better quality of coke and consequent prospect for higher operating rates, a far better supply of pig iron in 1949 is in prospect.

Speaking at the Thursday general session, Earl L. Shaner, chairman, Penton Publishing Co., Cleveland, and editor-in-chief, *Steel*, pointed to the progressive softening in demand for various goods the last few months as signaling the approach of a buyers' market. The new conditions will bring increased competition which will require not only intensified selling but also improved quality of product and the lowest possible cost, he added.

At the same time, Mr. Shaner indicated that a relatively high rate of business can be maintained in the future despite the fading of the lush postwar buying period—when availability of goods, rather than their price, was the major concern of buyers. This shakedown to reality will find buyers in less urgent need of many products, buyers who will have time to shop around for values. The competitive period ahead, Mr. Shaner said, will place emphasis on not only giving the greatest value for the least money, but also on development of new markets. In this connection he commended the activities of the society's Product Development Committee in seeking to create new outlets for steel castings.

Business Should Be Articulate

The labor relations outlook for 1949 will be affected to a large extent by what Congress does with pending labor legislation, it was stated by Lee C. Shaw, Chicago attorney of Seyfarth, Shaw & Fairweather. If the new labor law means a return to the Wagner Act or something stronger, union officials can replace businessmen as the most influential group in the country's economic life, he declared. The best interests of the nation will be served if the successor law to the Taft-Hartley Act preserves a balance in giving no unfair advantage to either management or employee. Unfortunately, he added, the pressure on Congressmen recently has come largely from the unions while representatives of business have been inarticulate in presenting their views concerning proposed revisions in labor legislation.

Prospect for business taxes this year likewise are not entirely clear, according to Walter F. Mehrlich, Arthur Andersen & Co., Chicago. Congress seems to show a lack of interest in enacting taxes to meet the additional $4 billion requested by the President, but if it becomes evident that a federal deficit will result this year, higher taxes seem likely to result, he indicated. The social security tax on individuals and employers will go from 1 per cent to 1½ per cent next January. Some avenues are open for reduction in government spending, such as would result from

(*Continued on page* 247)

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better co-operation between the defense units, and the major potential economies pointed out by the Hoover Commission. However, any proposals to lop off or consolidate government bureaus are likely to meet strong opposition, according to Mr. Mehrlich.

The luncheon concluding the annual meeting had as its principal speaker Dr. Robert S. Hartman, executive secretary, Council of Profit Sharing Industries, Columbus, O. Speaking on "Profit Sharing," Dr. Hartman declared that technical research has overlooked the resources of the individual, although human resources need as much development as do natural resources. Profit sharing by industry, he maintained, can do much to expand and strengthen the free enterprise system.

Describing profit sharing as any procedure under which all employees receive, in addition to good regular pay, special current or deferred sums, Dr. Hartman explained various types of plans. These include direct payments calculated as a certain percentage of the company's profits; wage dividends based on the amount of dividends paid stockholders; the stock ownership plan in which the company bears all or part of the cost; and trust plans which accumulate sums for retirement payments. Indirect payment plans include the so-called annual wage, the basing of payrolls as a percentage of sales; a sharing in cost savings; and the co-operative plan in which employees are both co-owners and co-managers.

Justice Department Checks Society

Gray Iron Founders' Society received a clean bill of health following a two-weeks' investigation of its activities by the U. S. Department of Justice, according to a recent announcement by Raymond L. Collier, executive vice president.

All society files were made available for scrutiny by the corps of investigators who removed 992 documents for further reference, all of which were returned.

Occasionally the press carries stories of anti-trust attacks on trade associations which builds up in the public mind the fact that the operations of all such organizations are probably sinister and against the public interest, whereas it is believed that well over 95 per cent of the accredited trade organizations in the country are not only law abiding but account for a vast amout of constructive work in the interest of their respective industries and the general public.

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...TRADE PUBLICATIONS...

AIR COMPRESSORS: Worthington Pump & Machinery Corp., 401 Worthington Ave., Harrison, N. J.—Selection chart, based on normal applications handling air with atmospheric intake pressure, aids selection of proper size compressor for average industrial use. It permits quick comparison between discharge pressure pounds per square inch gage, and piston displacement cubic feet per minute. It shows recommended compressor bore and stroke in inches.

DIE CASTING: Miller-Taylor Tool Co., 5005 Euclid Ave., Cleveland—Booklet covers the company's line of die casting machines for producing small, medium, heavy and outsize castings. It includes specifications for plunger gooseneck type machines for zinc, lead and tin; and cold chamber type machines for aluminum, brass and magnesium, with a table showing injection pressures obtainable on the latter type.

WELDING HELMETS: Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh 8—Illustrated bulletin CO-2 describes a combination head guard welding helmet featuring an instant release attachment which permits the welding shield to be removed quickly from the cap-type head guard. Also included in the bulletin are views of various styles of welding helmets along with complete descriptive data.

PRODUCTION CONTROL: Reeves Pulley Co., 1225 Seventh St., Columbus, Ind.—Illustrated bulletin GN-487 discusses the functions of automatic production control and the means of applying it to production machinery through use of the company's variable speed transmission and Motodrive in conjunction with automatic controls produced by the company.

LIFT TRUCK ATTACHMENT: Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg.—Catalog 1123 illustrates and describes a hydraulically controlled device which side squeezes bales, boxes, bundles, bags, barrels, drums, etc., with just enough pressure to lift without pallets. Attachment is designed for use on the company's 2000 and 4000-lb capacity lift trucks.

BLOWERS: Roots - Connersville Blower Corp., 903 Madison Ave., Connersville, Ind.—Bulletin 22-23-B-13 outlines some of the principal uses for rotary positive blowers and discusses operating advantages and principles of the company's blowers. Included are performance curves under various operating conditions, specifications and discussions of gears and blower accessories.

DIAL SCALES: Howe Scale Co., Rutland, Vt.—Bulletin 666 describes briefly the company's line of tape-drive dial scales. Copy is confined mostly to specifications of the scales so that the bulletin can be used for reference and ordering information when the specific unit has been selected to meet weighing requirements.

LATHE ACCESSORIES: South Bend Lathe Works, 299 East Madison St., South Bend 22, Ind.—Catalog 77-U describes, illustrates and prices more than 130 different attachments and accessories for lathes and drill presses. Although designed primarily for use on the company's tools, many of them can be adapted to other makes.

UNIT HEATERS: Ilg Electric Ventilating Co., 2850 North Pulaski Rd., Chicago 41—Illustrated catalog 348 covers factors in the designing of unit heating systems and the specification of equipment. Information is presented in brief form, with all reading matter and tables in large, easy-to-read type.

SPEED REDUCER: Cleveland Worm & Gear Co., 3293 East 80th St., Cleveland 4—Bulletin presents several case histories of typical installations of the company's worm gear speed reducer, showing facts and figures on actual savings realized by customers.

CRUCIBLES: American Crucible Co., North Haven, Conn.—Circular deals with newly designed thin-wall crucibles said to offer greater capacity for a given size combined with light weight. Features are explained and a table gives sizes, dimensions and capacities.

SAFETY POSTERS: National Safety Council, 20 North Wacker Dr., Chicago 6—Directory of occupational safety posters has 72 pages containing 744 illustrations of two, three and four-color posters, classified under 15 sections. Price, 50 cents.

LIFT TRUCK: Yale & Towne Mfg. Co., 4530 Tacony Ave., Philadelphia 15— Illustrated bulletin 5151 describes features of the company's electric fork lift truck. A load capacity chart is included.

DRILLING MACHINES: Sibley Machine & Foundry Corp., 206 East Tutt St., South Bend 23, Ind.—Catalog 68 lists the improved drilling machine features of the company drilling machines, models D-24 and D-28.

MOTOREDUCER: Falk Corp., 3001 West Canal St., Milwaukee 8—Bulletin 3101 describes the features of the company's new motoreducer and presents a list of district offices and representatives.

VACUUM CLEANER: Breuer Electric Mfg. Co., 5100 North Ravenswood Ave., Chicago 40—Leaflet illustrates and describes the company's new portable heavy duty industrial vacuum cleaner.

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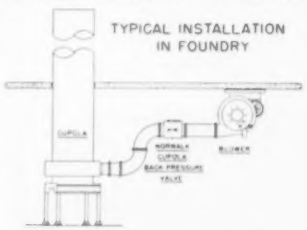

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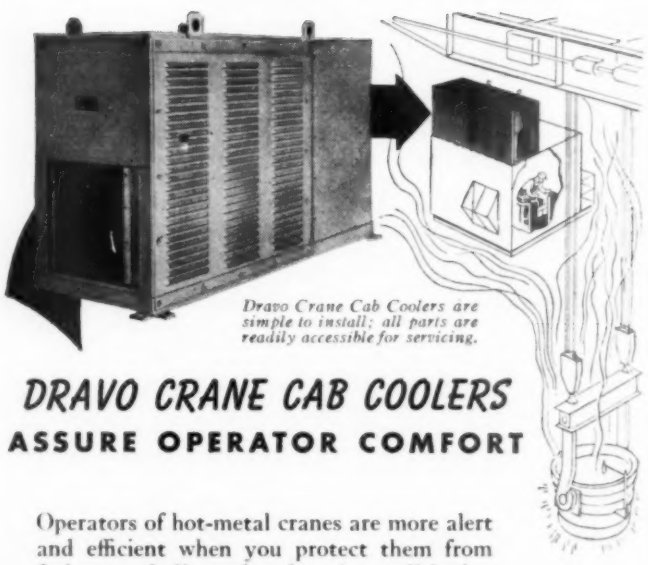

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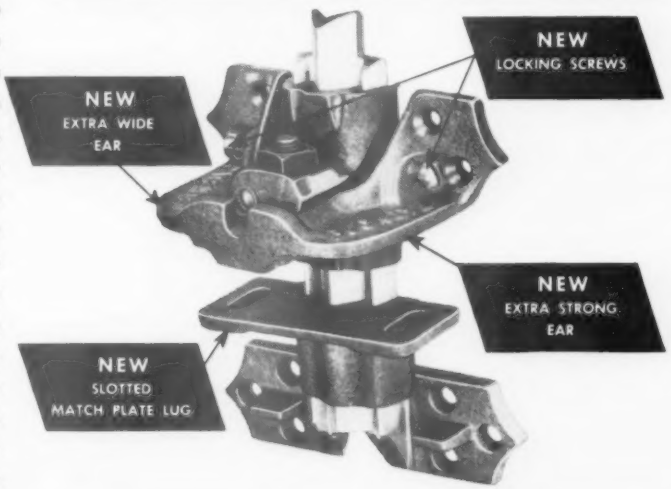

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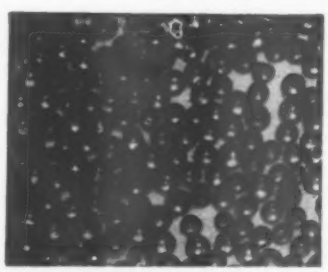

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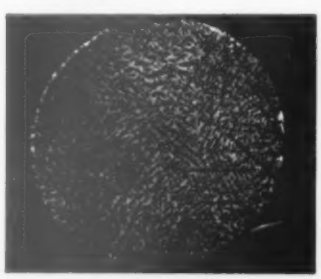

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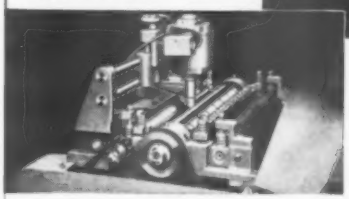

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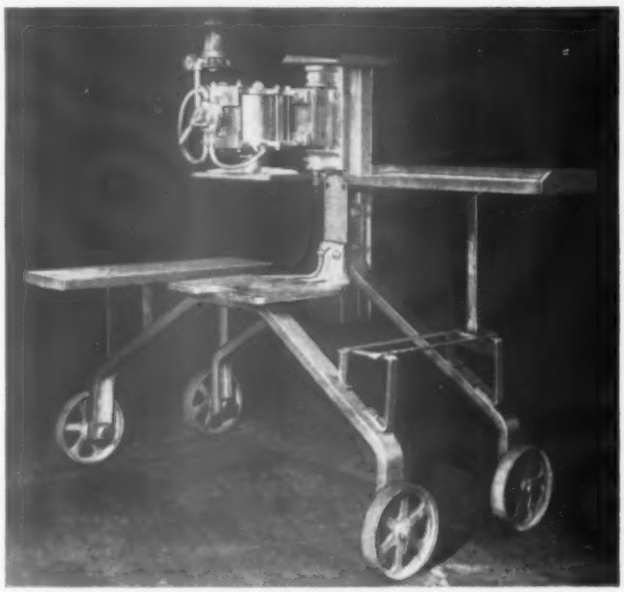

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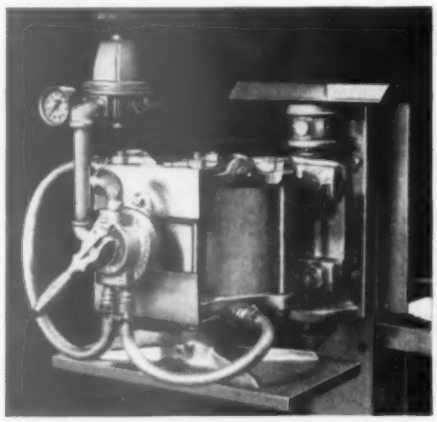

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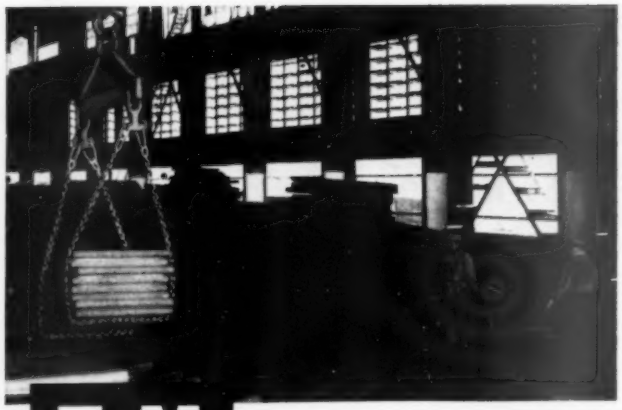

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THE paddle-type mixer for core sand mixing in the foundry. Blystone Mixers offer: low mix cost, thorough mixing, and easy operation. There is a sturdily built type and size for your problem. Send for Bulletin and full details.

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AMASTEEL is much better than hard iron or malleable abrasives.

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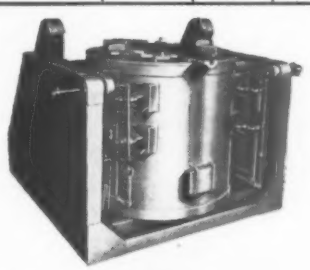
NON-FERROUS METAL
MELTING FURNACES

SELECTION TABLE

	TYPE	Max. Temp.	Series	Recommended for	Bulletin No.
TILTING	CRUCIBLE	2500°F.	TCR	Melting Brass and Copper	TC-45
		1400°F.	TCA	Melting Aluminum	TC-45
	POT	1400°F.	TP	Melting Aluminum and Magnesium	TP-45
STATIONARY	CRUCIBLE	2500°F.	CR	Melting Brass and Copper	CR-45
		1400°F.	AC	Melting Aluminum	AC-45
	POT	1400°F.	AM	Melting Aluminum	AM-45
		1200°F.	SM	Melting Soft Metals	AM-45
		1000°F.	SA SAV	Melting Soft Metals	SV-45

26348



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SURFACE COMBUSTION CORPORATION, TOLEDO 1, OHIO

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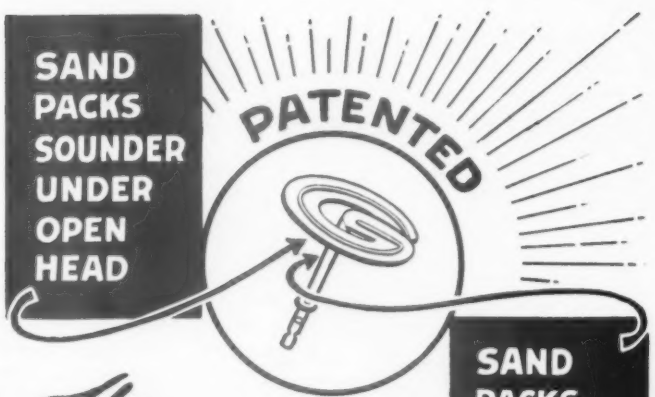

SAND PACKS SOUNDER AROUND CHAPLET STEM

The OPEN HEAD CHAPLET gives cores better support

The design and quality of this chaplet enables you to get more profit from your production, by reducing make-overs.
We also make Square Head Chaplets and Stem and Double Head types for heavier work.

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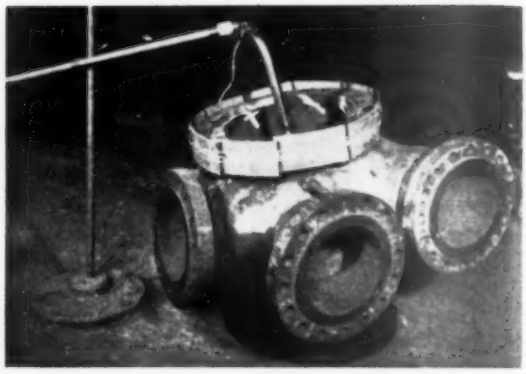
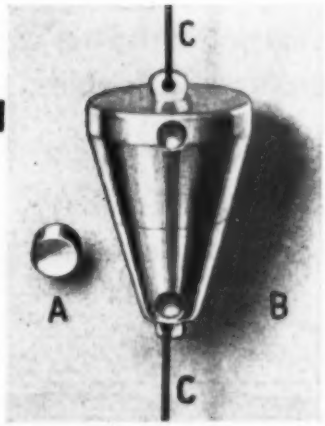
and make a short cut to more productive and economical foundry practice





The apparatus is as simple as
A—small radium capsule
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C—rigid string support

The use of gamma rays in radiographing steel castings has increased by leaps and bounds since 1930, when the first commercial use of radiography was marked by a picture of the sternpost of the cruiser "Chester". Radium radiography is simple, economical and effective; because it may be rented or leased, the equipment doesn't require a capital investment. Because it is simple to operate, it doesn't require especially skilled operators. By 1948 200 steel foundries were renting or leasing radium from the Radium Chemical Co., Inc., and today radium radiography is rapidly approaching the status of standard equipment in progressive steel foundries. Photograph shows a simple method for radiographing a flange on a heavy steel casting. Let us tell you more about the simplicity and economy of radium radiography; write today for prices, terms and case histories.

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Aside from its efficiency, the chief advantage of this Rammer lies in its long life. The Valve Unit will last for years without repair or replacement. The Cylinder Bore and Piston Rod are HARD CHROME PLATED, features which double the life of the Rammer and reduce maintenance costs at least one-half.

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This Modern Method Provides for:

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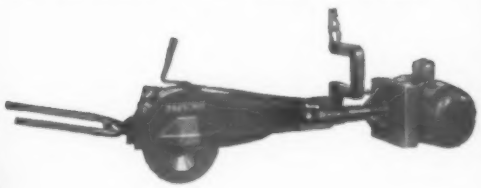

The Marschke Heavy Duty Swing Frame Grinder is easy to maneuver and gives maximum metal removal. Massively constructed for long, dependable service, this Marschke Grinder provides smooth, true wheel rotation for steady contact between the wheel and the work . . . gives minimum wheel wear. Provision is also made for adjustment of wheel surface speed to compensate for wheel wear.

Simplicity of construction, plus balance and maneuverability, contribute to efficient operation. These Marschke Grinders quickly pay for themselves and give many years of trouble-free service.

Other Marschke Grinders available include the "In-Between" Grinder, pedestal and floor stand grinders and buffers.

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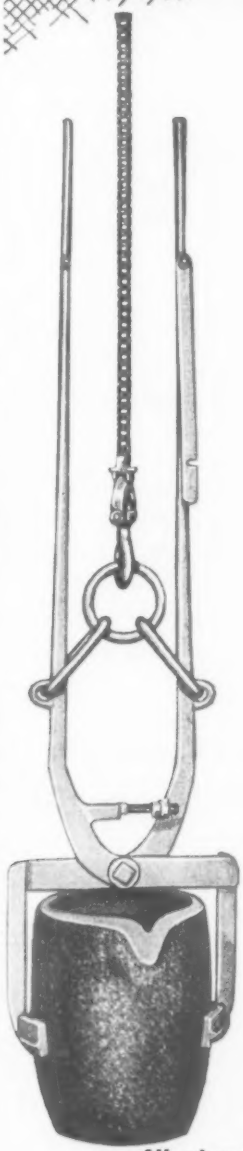

Here is the latest advance in tong engineering.

One glance at the illustration shows how simple the Industrial design actually is. And not only is it simple, it's *adjustable*. Turn the adjustment screw when necessary to compensate for wear and the four pads on the cross-arm or claws engage the pot firmly for lifting or carrying.

You will notice that this design is not complicated. It's simple, it's safe, yet it does everything you expect of a tong.

Notice also the Industrial design carries the crucible in the same manner as in the pouring shank. There is no crushing or pinching of the sidewalls. Eliminated are cracked pots from this cause.

Industrial furnishes this tong for all makes and sizes of crucibles. Write for details today.

- **LIGHT WEIGHT**
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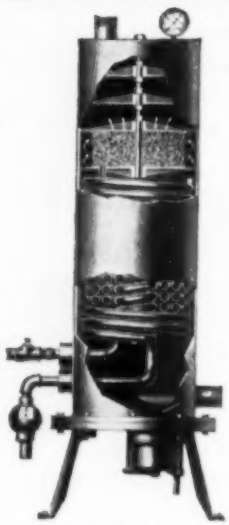

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50 to 2000 CFFAPM
Sizes
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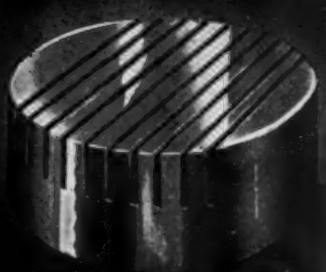

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Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock.

BRASS SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

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Slot widths: .010", .013", .015"
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

SCREEN TYPE CORE BOX VENTS
Mesh: ±30, ±40, ±50.
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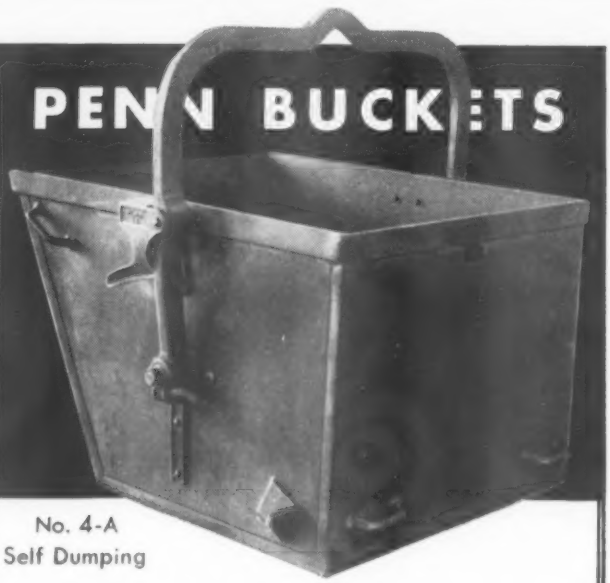

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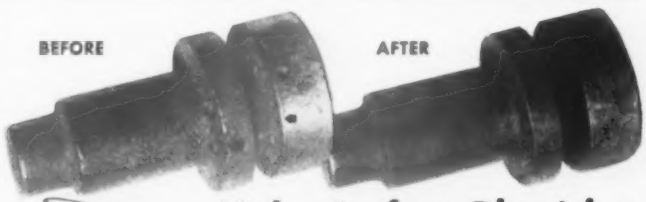

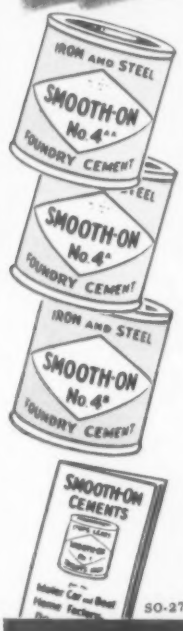

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HELPFUL LITERATURE

***NOTE TO READERS:** If you will check the item or items described which particularly interest you, we will be glad to request the manufacturers concerned to send you their literature. Use the attached postal card.*

1. Hoists & Cylinders

Miller Motor Co.—Two illustrated publications file No. 258 and No. H-104 cover safety air hoist and hydraulic cylinders, respectively. Latter are leakproof high pressure type built for 2000-pound per square inch heavy-duty service involving pushing, pulling, lifting and clamping operations.

2. Blast Cleaning

Pangborn Corp.—6-page illustrated bulletin No. 1400 discusses Hydro-Finish process which is modified form of impact blasting using abrasive suspended in liquid which is delivered to blasting nozzle by means of circulating pump. Velocity is imparted to suspension by injection of compressed air.

3. Abrasive Wheels

Allison Co.—Illustrated bulletins 4948B, 1948BR, 2948P and 4948R describe resinoid bonded cut-off wheels, ball race grinding wheels, rubber bonded polishing wheels and rubber bonded abrasive cut-off wheels respectively.

4. Buckets, Shovels & Cranes

Orton Crane & Shovel Co.—Two illustrated catalogs Nos. 75 and 79 present data on five types of buckets and on Powermatic series of convertible shovels, draglines and cranes, respectively. Latter feature Powermatic air-operated control which permits craneman to operate machine with no appreciable fatigue.

5. Portable Air Tools

Buckeye Tools Corp.—44-page illustrated catalog "The New Stream Power Air Tools by Buckeye" discusses features and presents specifications of horizontal grinders and buffers, vertical grinders and disk sanders, drills and reamers, screwdrivers and nutrunners, wrenches, shears and nibblers.

6. Air Compressor Lubrication

Petroleum Advisers, Inc.—40-page illustrated service manual entitled "Air Compressor Lubrication" discusses how lubricants affect compressor operation and how to benefit most from their use. All factors involved in air compressor operation and maintenance are covered from lubrication standpoint.

7. Blast Nozzles

Mills Alloys, Inc.—Two-color catalog illustrates complete line of Super-Titan blasting nozzles which incorporate tungsten carbide liners for wear resistance. Use of blast nozzles in foundry, heat treating, cleaning and other industries is explained.

8. Industrial Trailers

Mercury Mfg. Co.—16-page illustrated bulletin A-999 explains efficiency and economies possible with trailers, especially when used in "Trackless Train" system. Applications of caster, four-wheel steer and fifth-wheel steer types are discussed. Special design trailers for specific industrial materials handling operations are described.

9. Refractory Linings

Ironton Fire Brick Co.—4-page illustrated bulletin "Ironton Caro-Line" covers preparation, use and recommended thicknesses of this monolithic refractory lining for steel and malleable foundry ladles, acid electric furnaces and side blow converters.

10. Air Compressors

Davey Compressor Co.—2-page illustrated bulletin E-219 is descriptive of air compressors which are designed for installation in individual departments of plants to supply compressed air in accordance with needs of department.

11. Trolley Conveyors

Link-Belt Co.—28-page illustrated bulletin No. 2330 shows flexible adaptability of overhead trolley conveyors by pictures of actual installations in wide variety of industries. Use of these units for mechanized materials handling in foundries is demonstrated.

12. Universal Tester

W. C. Dillon & Co.—4-page illustrated bulletin L describes six sizes of portable universal testers which are designed for precision tensile testing in range up to 10,000 pounds. All types of materials can be tensile tested on these machines which can be hand operated or motorized.

13. Cranes & Monorails

Abell-Howe Co.—12-page illustrated bulletin "For Low Cost Material Handling" presents details of top-running, underhung and double girder motorized cranes; geared, push and transfer type hand operated cranes; and other equipment such as jib cranes, monorails, switches, crane runways, hoists and storage racks.

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14. Separation Magnets

Ohio Electric Mfg. Co.—4-page illustrated bulletin F-2001 gives detailed information on application, construction, selection and suspension of Ohio separation and road sweeping magnets. Data are presented on field attraction and penetration, magnet dimensions, weights and lifting capacities.

15. Crucibles

American Crucible Co.—4-page illustrated bulletin describes available sizes and capacities of Starbide carbon-bonded silicon carbide crucibles which offer maximum capacity for given size.

16. Riddling Machines

Roller Riddle Corp.—4-page illustrated bulletin "Why Riddle Your Sand By Hand?" describes machine that riddles enough sand to cover pattern plate in 3 seconds. Unit oscillates 900 times per minute, has permanently lubricated sealed bearings and can be supplied with any required mesh screen.

17. Diecasting Machines

Hydraulic Press Mfg. Co.—6-page illustrated bulletin 4803 discusses advantages of hydraulic diecasting as means of producing precision metal parts quickly and inexpensively and shows typical parts produced by this method. Submerged plunger and cold chamber types of hydraulic diecasting machines are described.

18. Curved-Tooth Files

American Swiss File & Tool Co.—8-page illustrated bulletin on milled curved-tooth files for use on metals, alloys and hard nonmetallic materials describes 150 shapes, sizes and cuts. Designs include rigid files with and without tangs and flexible, curved and reveal files.

19. Power Wheelbarrow

Bell Aircraft Corp.—8-page illustrated bulletin "The Bell Prime-Mover" shows typical industrial uses of this gasoline engine driven wheelbarrow which hauls up to 10 cubic feet or 1000 pounds of material. In addition to wheelbarrow model, this unit can be supplied with tilting type steel platform for general materials handling operations.

20. Refractory Mortar

Walsh Refractories Corp.—2-page illustrated bulletin "Here's Where Savings Begin" explains advantages and typical uses of Mort-Airset refractory air-setting cement for laying and surfacing fire brick.

21. Gray Iron

Gray Iron Founders' Society, Inc.—12-page illustrated technical bulletin is reprint of "Gray Iron—Its Mechanical and Engineering Characteristics and Details for Designing Cast Components" which appeared in THE FOUNDRY. When and how to use gray iron is explained, and complete technical information is included.

22. Industrial Lift Trucks

Lift Trucks, Inc.—12-page illustrated bulletin K-48 is designed to aid industrial truck users in selection of proper truck for a specific materials handling operation. Skid loading, width clearance, under clearance and overhand are discussed in detail. Details are presented on Hydroelectric line of trucks which includes pallet, platform and tractor models.

23. Flexible Shafting

Elliott Mfg. Co.—16-page illustrated catalog No. 49 describes single and multiple speed, medium and heavy duty flexible shaft machines for wide range of grinding, finishing and polishing operations. Also covered are handpieces, angle heads, abrasive and wire wheels, rotary files and burs and other accessories for use with machines.

24. Flexible Pipe Joints

Moran Flexible Joint Co.—12-page illustrated catalog No. 26 is descriptive of flexible ball joints for steam, air, gas or liquids which are conveyed in pipe lines. Also covered is an automatic brass filler for filling barrels, half-barrels and drums.

25. Permanent Magnets

Dings Magnetic Separator Co.—4-page illustrated bulletin B-1205A shows how Perma-Plate high intensity Alnico magnets can be installed in or above chutes, ducts, pipes, hoppers, spouts, belt conveyors and feed tables for removal of tramp iron. General duty, heavy duty and extra strong magnets are available in sizes from 2 to 72 inches in increments of 2 inches.

26. Blast Cleaning

Pangborn Corp. — Illustrated 24-page bulletin No. 1200 and 28-page bulletin No. 300A deal with blast cleaning equipment and accessories and supplies for blast cleaning respectively. Both airless and air type blast cleaning machines are covered in sizes to fit practically every need. Details are given on dust control equipment, Hydro-Sand blast and core knockout units, casting washers and shot peening machines.

27. Alloy Steel Chain

S. G. Taylor Chain Co.—Illustrated booklet "Inspection, Care and Use of Taylor Made Alloy Steel Chain" lists factors to look for when inspecting chain, elements that govern proper use of chain, maximum wear limits for each diameter, safe working load limits and correct methods of repairing chain.

28. Band Sawing Machines

DoALL Co.—8-page illustrated catalog "They Cover the Field" gives specifications on complete line of Zephyr band sawing machines ranging from utility model with 16-inch throat to powerful precision model with 60-inch throat. Photos show techniques used in cutting aluminum and iron castings, woodworking, and friction-cutting alloy steel and pipe.

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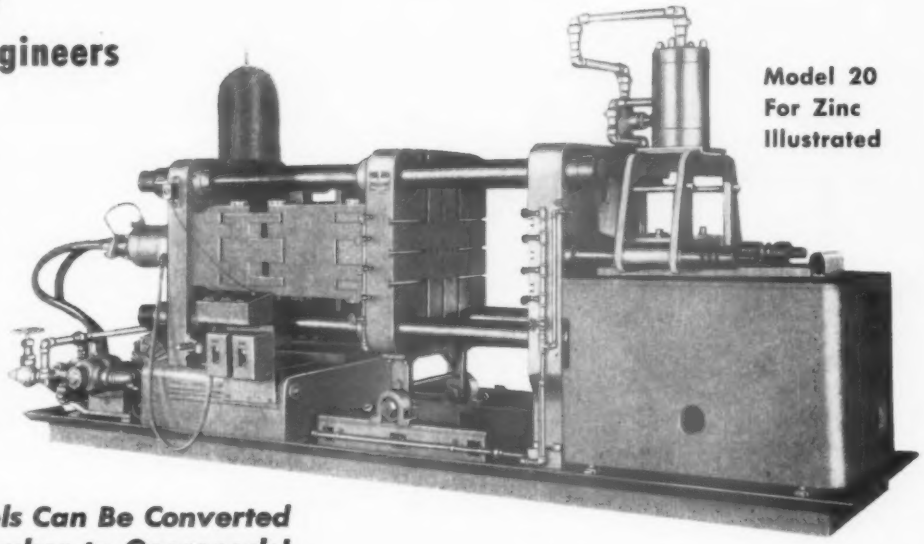

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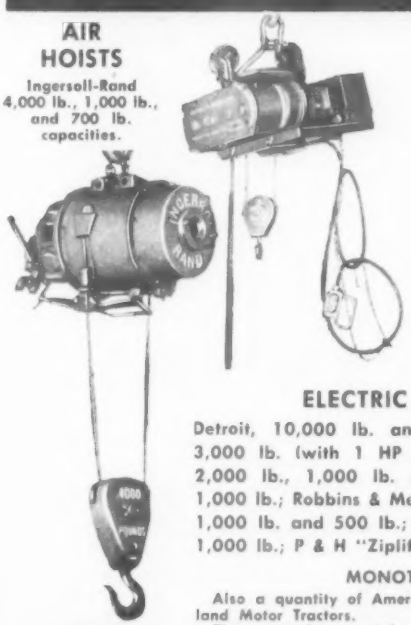

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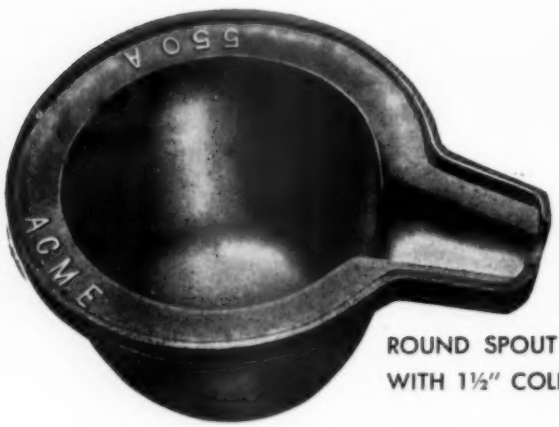

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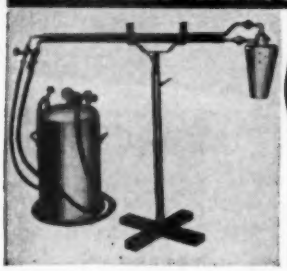

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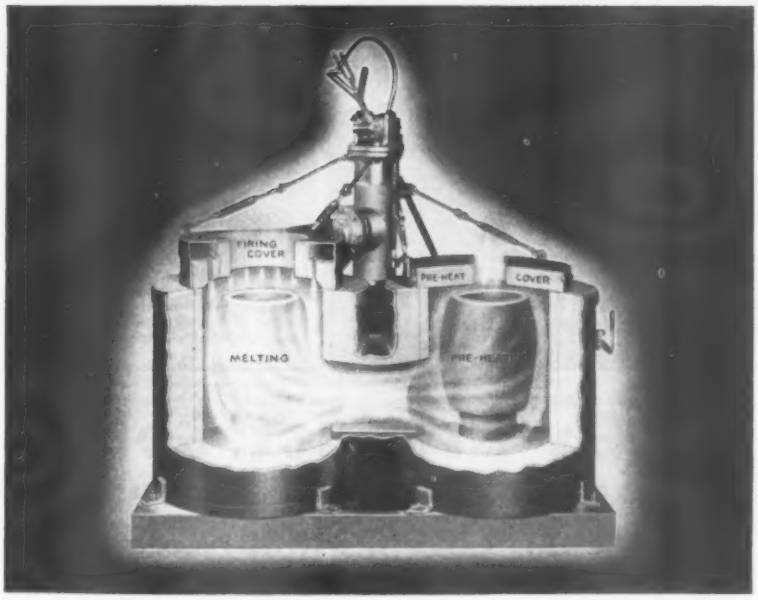

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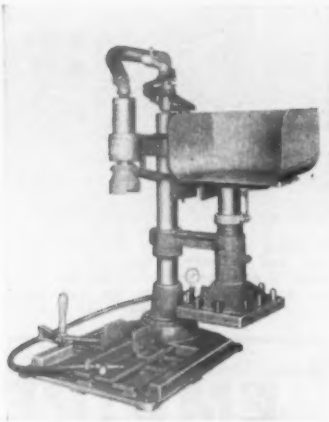

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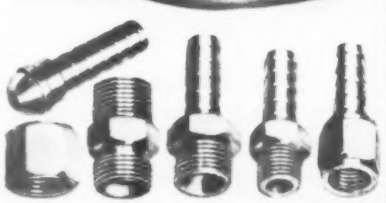

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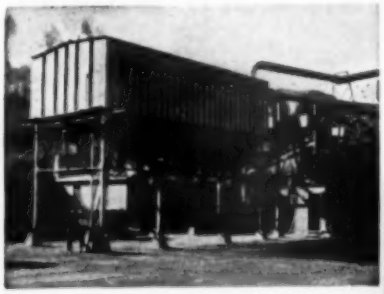

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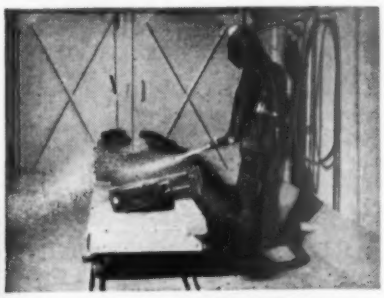

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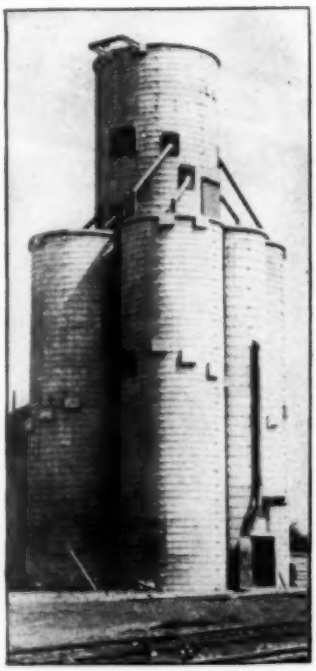

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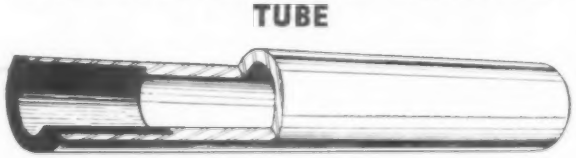

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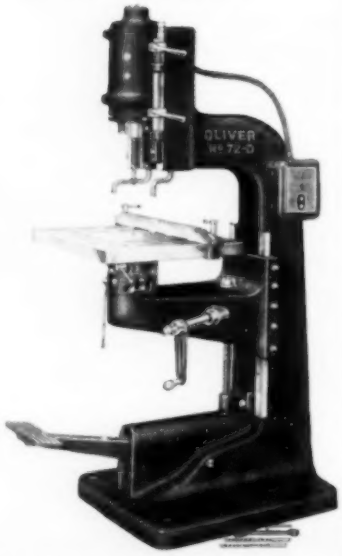

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Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
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American Air Filter Co., Louisville 8, Ky.
Foxboro Company, Foxboro, Mass.
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AIRLESS BLAST CLEANING EQUIPMENT

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

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Federated Metals Div.
American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
General Cerium Co., 1038 River Road, Edgewater, N. J.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.

ALLOYS (Ferro)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Keokuk Electro Metals Co., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

ALUMINUM and ALUMINUM ALLOYS

Ajax Metal Co., 46 Richmond St., Philadelphia 23, Pa.
Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Federated Metals Division, American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Sonken-Galamba Corp., Kansas City 18, Kansas.
U. S. Reduction Co., East Chicago, Ind.

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Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Cleveland Electro Metals Co., West 38th St. & NP R.R., Cleveland 13, O.
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U. S. Reduction Co., E. Chicago, Indiana.

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Pressed Steel Co., Wilkes-Barre, Pa.

ANNEALING BOXES

Pressed Steel Co., Wilkes-Barre, Pa.

ANNEALING CORES

Pressed Steel Co., Wilkes-Barre, Pa.

ANNEALING FURNACES (Electric)

Ajax Electrothermic Corp., Trenton, N. J.

ANNEALING POT RAPPERS

New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

ANNEALING TUBES

Pressed Steel Co., Wilkes-Barre, Pa.

AERATORS

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Jeffrey Mfg. Co., Columbus 16, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
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Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

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Kirk & Blum Mfg. Co., Cincinnati 25, O.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

ASSOCIATIONS

Crucible Manufacturers Association, 90 West St., New York 6, N. Y.
Gray Iron Founders Society Inc., 210 National City Bank Bldg., Cleveland 14, Ohio.

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Atlantic Saw Mfg. Co., New Haven, Conn.

BAND SAWS (High Speed)

Tannewitz Works, Grand Rapids, Mich.

BAND SAWS (Variable Speed)

Tannewitz Works, Grand Rapids, Mich.

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Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

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Pressed Steel Co., Wilkes-Barre, Pa.

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Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Raybestos-Manhattan Inc., Manhattan Rubber Division, Passaic, N. J.

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Raybestos-Manhattan Inc., Manhattan Rubber Division, Passaic, N. J.

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Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.

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American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
George Pfaff Inc., 11-61 Jackson Ave., Long Island City, N. Y.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

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Link-Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Taylor Chain Co., S. G., Hammond, Ind.

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Cleveland Chain Mfg. Co., Broadway & Henry Sts., Cleveland 5, Ohio
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Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.
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Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
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Swan-Finch Oil Corp., R.C.A. Bldg., West, New York 26, N. Y.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 647 East Virginia St., Milwaukee 4, Wis.
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CORE BLOWERS

Martin Engineering Co., Kewanee, Ill.

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Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

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Harrison Machine Co., 2725 Station Rd., Wesleyville, Pa.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

CORE COMPOUND

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Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Swan-Finch Oil Corp., R.C.A. Bldg., West, New York 26, N. Y.
Thiem Products Co., 647 East Virginia St., Milwaukee, Wis.
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Newaygo Engineering Co., Newaygo, Mich.

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Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.

CORE KNOCKOUT MACHINES

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Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
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Simplicity Engineering Co., Durand, Mich.

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Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
Harrison Machine Co., 2725 Station Rd., Wesleyville, Pa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
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Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

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American Red Star Co., 747 Beaubien St., Detroit 26, Mich.
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
Foundry Service Co., Birmingham, Ala.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Swan-Finch Oil Corp., R.C.A. Bldg., West, New York 26, N. Y.
Thiem Products Co., 647 East Virginia St., Milwaukee, Wis.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

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Kirk & Blum Mfg. Co., Cincinnati 25, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Morrison Engineering Corp., 5006 Euclid Ave., Cleveland, Ohio.
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Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
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Foundry Service Co., Birmingham, Ala.
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Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

CORE RODS

Bethlehem Steel Co., Bethlehem, Pa.

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Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
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E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
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Stevens Frederic B., Inc., Detroit 26, Mich.
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Thiem Products Co., 647 East Virginia St., Milwaukee, Wis.
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Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

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Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
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EXHAUST SYSTEMS (Cont'd.)

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Whiting Corporation, 15607 Lathrop Ave., Harvey, Pa.

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Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
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Ohio Ferro-Alloys Corp., Canton 2, O.
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Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

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Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

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Molybdenum Corp. of America, Pittsburgh 19, Pa.

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Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

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Robinson Clay Product Co., 1100 Second National Bldg., Akron, Ohio.
Stevens Inc., Frederic B., Detroit 16, Mich.
Chas. Taylor Sons Co., Carew Tower, Cincinnati 2, Ohio

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Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
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Robinson Clay Product Co., 1100 Second National Bldg., Akron, Ohio.
Chas. Taylor Sons Co., Carew Tower, Cincinnati 2, Ohio

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Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

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Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

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U. S. Air Compressor Co., 5300 Harvard Ave., Cleveland 5, Ohio

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Chicago Mfg. & Distributing Co., 1928 W. 16th St., Chicago 9, Ill.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

FLASK BUSHINGS

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
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Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

FLASK PINS

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Diamond Clamp & Flask Co., Richmond, Ind.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

FLASKS (Adjustable)

C. S. Humphrey Co., 249 2nd St., Moline, Ill.

FLASKS (Aluminum)

Adams Co., Dubuque, Iowa.
Foundry Service Co., Birmingham, Ala.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

FLASKS (Dowmetal)

Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

FLASK FILLERS

Bartlett & Snow, C. C., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., Columbus 16, O.

FLASKS (Slip)

Adams Co., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

FLASKS (Snap)

Adams Co., Dubuque, Iowa.
Arcade Manfacturing Div. Rockwell Mfg. Co., Freeport, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Stevens, Inc., Frederic B., Detroit 16, Mich.

FLASKS (Steel)

Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Foundry Service Co., Birmingham, Ala.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Shanafelt Mfg. Co., 2623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

FLASK FITTINGS

Adams Co., Dubuque, Iowa.
Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio.

FLASK LIFT MACHINES

Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.

FLASK LUMBER

Dougherty Lumber Co., 4300 E. 66th St., Cleveland 5, O.

FLASKS (Wood)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 16th St., Chicago 9, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.

FLEXIBLE SHAFT MACHINERY

Stow Mfg. Co., Binghamton, N. Y.

FLOORING (Non-Slip)

Norton Co., Worcester 6, Mass.

FLUXES

American-British Chemical Supplies Inc., 180 Madison Ave., New York 16, N. Y.
Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Foundry Services, Inc., 280 Madison Ave., New York 16, N. Y.
Mathieson Chemical Corp., 60 E. 42nd St., New York 17, N. Y.
National Pigment Co., East York St., Philadelphia, Pa.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Puro-Seal Co., 414 Swetland Bldg., Cleveland 13, Ohio
Rossborough Supply Co., 1456 W. 9th St., Cleveland 13, O.
Thiem Products Co., 647 East Virginia St., Milwaukee 4, Wis.
U. S. Reduction Co., E. Chicago, Indiana

FLUXES (Soldering, Welding & Tinning)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

FOUNDRY CONSULTANTS

A. A. Wickland Co., 205 W. Wacker Dr., Chicago 6, Ill.

FOUNDRY ENGINEERS

A. A. Wickland Co., 205 W. Wacker Dr., Chicago 6, Ill.

FOUNDRY LAYOUT & METHODS

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
A. A. Wickland Co., 205 W. Wacker Dr., Chicago 6, Ill.

FOUNDRY NAILS

Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SHOVELS
(See SHOVELS)

FOUNDRY SUPPLIES

Rossborough Supply Co., 1456 W. 9th St., Cleveland 13, O.

FOUNDRY SUPPLY HOUSES

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
Stevens, Inc., Frederic B., Detroit 16, Mich.

FURNACES (Aluminum & Magnesium Billets)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd , Cleveland 13, Ohio.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, Ohio

FURNACES (Aluminum & Magnesium Forgings)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

FURNACES (Aluminum Melting)

Ajax Engineering Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Surface Combustion Corp., Toledo 7, Ohio.

FURNACES (Aluminum Rivet Heating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.

FURNACES (Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
Surface Combustion Corp., Toledo, Ohio
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Crucible Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Johnston Mfg. Co., Minneapolis 13, Minn.
Randall Foundry Equipment Corp., 4600 E. 71st St., Cleveland 5, O.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave, Franklin Park, Ill.

FURNACES (Electric Melting)

Ajax Electric Furnace Corp., 46 Richmond St., Philadelphia 23, Pa.

FURNACES (Electric Melting) (Cont'd.)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Gas or Oil Fired)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, Ohio.
Randall Foundry Equipment Corp., 4600 E. 71st St., Cleveland 5, O.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Surface Combustion Corp., Toledo, Ohio

FURNACES (Gray Iron Melting)

American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Heat Treating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.

FURNACES, HEAT TREATING (Electric)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.

FURNACES (Malleable Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Malleable Melting)

American Bridge Co., Pittsburgh 19, Pa.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Nonferrous Melting)

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., Harrison, O.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Johnston Mfg. Co., Minneapolis 13, Minn.
Randall Foundry Equipment Corp., 4600 E. 71st St., Cleveland 5, O.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Powdered Coal)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Steel Melting)

Ajax Electrothermic Corp., Trenton, N. J.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACE BLOWERS

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Roots-Connersville Blower Corp., Connersville, Ind.

FURNACE LININGS

Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Perth Amboy, N. J.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
A. P. Green Fire Brick Co., Mexico, Missouri
Ironton Fire Brick Co., Ironton, O.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
United States Graphite Co., Saginaw, Mich.

GAGES

Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.

GAGGERS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

GAS (Oxygen, Acetylene, Industrial)

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

GAS BURNERS

Fisher Furnace Co., 2543 West Hubbard St., Chicago 12, Ill.

GENERATORS (Acetylene)

Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

GLOVES (Industrial, Safety)

American Optical Co., Southbridge, Mass.
Edmont Mfg. Co., Coshocton, Ohio.
C. Walker Jones Co., 6135 Lambert St., Philadelphia 38, Pa.

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Willson Products Inc., Reading, Pa.

GRAPHITE

Acheson Colloids Corp., Port Huron, Mich.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Independent Pneumatic Tool Co., Aurora, Ill.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.
Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.
U. S. Electrical Tool Co., Cincinnati 4, O.

GRINDERS (Flexible Shaft)

Stow Mfg. Co., Binghamton, N. Y.

GRINDERS (Pneumatic Portable)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Independent Pneumatic Tool Co., Aurora, Ill.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.

GRINDERS (Surface, Bench, Disc, Floor)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Independent Pneumatic Tool Co., Aurora, Ill.
Skilsaw, Inc., 5000 N. Elston, Chicago 30, Ill.
Standard Electrical Tool Co., 2488 Riverside Ave., Cincinnati 4, Ohio.
U. S. Electrical Tool Co., Cincinnati 4, O.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind

GRINDERS (Swing Frame)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDING WHEELS—See ABRASIVE WHEELS

GRINDING WHEEL DRESSERS

Carborundum Co., Niagara Falls, N. Y.
Desmond-Stephan Mfg. Co., Urbana, O.

GRINDSTONES

Bay State Abrasive Products Co., Westboro, Mass.
Sterling Grinding Wheel Div., Cleveland Quarries Co., 1740 E. 12th St., Cleveland, O

GRIT (Abrasive)

Alloy Metal Abrasive Co., Ann Arbor, Mich.
American Steel Abrasives Co., Galion, O.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Carborundum Co., Niagara Falls, N. Y.
Clayton Sherman Abrasives Co., 3896 Lonyo Rd., Detroit 10, Mich.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, O.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.

HAMMERS (Chipping)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Independent Pneumatic Tool Co., Aurora, Ill.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Schramm Inc., West Chester, Pa.

HARDNESS TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

HEAT CONTROL AND RECORDING DEVICES

Brown Instrument Co. Div. Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia 44, Pa.
Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

HEATERS (Gas, Oil, Electric)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

HEATERS (Gas, Oil, Electric)

Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N.Y.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp., Trenton, N. J.

HEATERS (Indirect Fired)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

HEATERS (Space, Unit, Direct Fired)

Dravo Corp., Dravo Bldg., Pittsburgh 22, Pa.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.

HEATERS (Space, Unit, Oven, Water)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Westinghouse Electric Corp., B. F. Sturtevant Div., 40 Wall St., New York 4, N. Y.

HELMETS (Blasting)

American Wheelabrator & Equipment Co., Mishawaka, Ind.
American Optical Co., Southbridge, Mass.
Mine Safety Appliance Co., Braddock, Thomas & Meade Sts., Pittsburgh 8, Pa.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.

HELMETS (Welding)

American Optical Co., Southbridge, Mass.

HOISTS (Air)

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Gardner-Denver Co., Quincy, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.

HOISTS (Chain)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
David Round & Sons, Broadway & Henry Sts., Cleveland 5, Ohio

HOISTS (Electric)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
David Round & Sons, Broadway & Henry Sts., Cleveland 5, Ohio
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Modern Equipment Co., Port Washington, Wis.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Robbins & Myers, Inc., Springfield, Ohio.

HOIST (Electric) (Cont'd.)

Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

HOISTS (Hand)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
David Round & Sons, Broadway & Henry Sts., Cleveland 5, Ohio

HOPPERS (Sand)

Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

HOSE (Air, Blasting, Water, Gas)

Gardner-Denver Co., Quincy, Ill.
Hewitt Rubber Div. Hewitt-Robins Div., Inc., 240 Kinsington Ave., Buffalo 5, N. Y.
Independent Pneumatic Tool Co., Aurora, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pangborn Corp., Hagerstown, Md.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Schramm Inc., West Chester, Pa.

HYDRAULIC CLEANING EQUIPMENT

Hydro-Blast Corp., 2050 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.

HYDRO FINISHING EQUIPMENT

Pangborn Corp., Hagerstown, Md.

ILLUMINATORS (X-Ray Film)

Eastman Kodak Co., Rochester, N. Y.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

IMPREGNATING SYSTEMS

Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.

INDUSTRIAL ENGINEERING SERVICE

Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
Westover Engineers, 424 E. Wells St., Milwaukee 2, Wis.

INGOT MOLDS

Acme Foundry Co., Detroit 16, Mich.

INGOTS (Nonferrous)

Ajax Metal Co., Philadelphia 23, Pa.
American Smelting and Refining Co., 120 Broadway, New York 5.
Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.
Cleveland Electro Metals Co., W. 38th St. & NP R.R. Cleveland 13, O.
Federated Metals Div., American Smelting and Ref. Co., New York 5.
International Nickel Co., Inc., 67 Wall St., New York City 5.
Niagara Falls Smelting & Refining Div., Continental - United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Rossborough Supply Co., 1456 W. 9th St., Cleveland 13, O.
Silverstein & Pinsof, Inc., 1720 N. Elston, Chicago 22, Ill.
Sonken-Galamba Corp., Kansas City 18, Kansas.
U. S. Reduction Co., East Chicago, Ind.

INJECTION MOLDING MACHINES

Lester-Phoenix Inc., 2711 Church St., Cleveland 13, Ohio.

INOCULANTS

Carborundum Co., Perth Amboy, N. J.

IRON CEMENT

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE

Bethlehem Steel Co., Bethlehem, Pa.
Pickands, Mather & Co., Cleveland 14, O.

IRON OXIDES

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.

JACKETS (Mold)

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

LABORATORY EQUIPMENT (Chemical)

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.
Laboratory Equipment Corp., St. Joseph, Mich.

LABORATORY EQUIPMENT (Physical)

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.
Laboratory Equipment Corp., St. Joseph, Mich.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

LADLES

Bethlehem Steel Co., Bethlehem, Pa.
Foundry Service Co., Birmingham, Ala.
Industrial Equipment Co., Minster, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Modern Equipment Co., Port Washington, Wis.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE HEATERS

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS

A. P. Green Fire Brick Co., Mexico, Missouri
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, Ohio.

LATHE CENTERS

Chicago Mfg. & Distributig Co., 1928 W. 46th St., Chicago 9, Ill.

LEAD

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

LINSEED OIL

Hercules Powder Co., Wilmington 99, Del.

LOADERS

Clearfield Machine Co., Clearfield, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

LUBRICANTS (Industrial)

Acheson Colloids Corp., Port Huron, Mich.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Swan-Finch Oil Corp., R. C. A. Bldg., West, New York 26, N. Y.
United States Graphite Co., Saginaw, Mich.

LUMBER (All kinds)

Dougherty Lumber Co., 4300 East 68th St., Cleveland 5, O.

MACHINE KEYS

Standard Horse Nail Corp., New Brighton, Pa.

MACHINERY MOUNTING PADS

Fabreeka Products, Inc., 222B Summer St., Boston, Mass.

MAGNESIUM (Ingots)

Apex Smelting Co., 2537 West Taylor St., Chicago 12, Ill.

MAGNET CONTROLLERS

Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.

MAGNETS

Dings Magnetic Separator Co., 4740 W. McGeough, Milwaukee 7, Wis.
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

MANGANESE (Briquets)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

MATCHPLATES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Champion Foundry & Machine Co., 1553 West Madison St., Chicago 7, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

MATERIALS HANDLING

Hughes-Keenan Co., Mansfield, Ohio.
Orton Crane & Shovel Co., 608 So. Dearborn, Chicago, Ill.

MATERIALS HANDLING DESIGN

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.

MATERIALS HANDLING (Hoists)

Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

MECHANICAL ENGINEERS

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Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
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METAL CLEANING EQUIPMENT

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Pangborn Corp., Hagerstown, Md.

METAL CUTTING BAND SAWS

Tannewitz Works, Grand Rapids, Mich.

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General Electric X-Ray Corp., 4855 West McGeoch Ave., Milwaukee 14, Wis.

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Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago 10, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.

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American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
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Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.
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Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
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Parkwood Corp., Wakefield, Mass.

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Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
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Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Morrison Engineering Corp., 5005 Euclid Ave., Cleveland, Ohio.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N. Y.

MOLD TRUCKS (Power Operated)

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MOLDERS BENCHES

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Davenport Machine & Foundry Co., Davenport, Iowa.
Foundry Service Co., Birmingham, Ala.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
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Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
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Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
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Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
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Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
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Frederic B. Stevens, Inc., Detroit 16, Mich.
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Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Cleveland 14, O.
Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.
Woodward Iron Co., Woodward, Ala.

PIG IRON (Silvery)

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Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
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Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
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Foundry Service Co., Birmingham, Ala.
Frederic B. Stevens, Inc., Detroit 16, Mich.
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United States Graphite Co., Saginaw, Mich.

PNEUMATIC TOOLS

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Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
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Roots-Connersville Blower Corp., Connersville, Ind.

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Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago 10, Ill.
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Clearfield Machine Co., Clearfield, Pa.
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Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
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SANDERS (Tapered-Spindles)

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Under 40 in jobbing foundry. Must have foundry experience—location New York, New Jersey area. State experience, personal data and salary expected. Address: Box 449, The FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

Experienced man for supervision of core room in the making of large and small cores for grey iron production foundry. Completely modern facilities for bench, air-machine and roll-over work. Man selected must be thoroughly familiar with all phases of core making. Advancement assured the man with ability. A progressive firm located in the Middle West. State experience, personal data and salary expected in first letter. Address: Box 461, The FOUNDRY, Cleveland 13, Ohio.

MALLEABLE FOUNDRY FOREMAN

West coast foundry needs foreman to take over complete charge of squeezer, molding and pouring of pipe fittings. Must be thoroughly experienced. State qualifications, salary required and how soon available. Address: Box 459, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

By well established agricultural implement concern in Western New York. Experienced in bench, floor, machine molding. Address: Box 456, The FOUNDRY, Cleveland 13, Ohio.

Accounts Wanted

SALES ENGINEER REPRESENTATION

Chicago and surrounding territory on foundry and industrial equipment. Thoroughly familiar with all phases of shop practices. Foundry equipment, patterns and castings a specialty. 15 years sales manager for leading foundry and industrial equipment manufacture. Wonderful local contacts, also national. Address: Box 466, The FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL SALES REPRESENTATION

Throughout Western Pennsylvania, West Virginia and Eastern Ohio offered to reliable manufacturers, including castings and forgings. Our salesmen are efficient, aggressive and fully cover territory outlined. Address: Box 455, The FOUNDRY, Cleveland 13, Ohio.

Manufacturer's Agents

SALESMEN

Manufacturer of centrifugal casting machines, permanent molds and foundry equipment has territories open nationally for manufacturers agents contacting the foundry trade. Men we want must be well established in their territory with a successful record selling to the foundry trade. Exclusive territory will be granted. Small investment will be required. Address: Box 448, The FOUNDRY, Cleveland 13, Ohio.

MANUFACTURER'S AGENT

Central Wisconsin grey iron foundry producing castings to 100 pounds desires commission representative. Address: Box 471, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

SALES AND SERVICE REPRESENTATION

Foundry engineer and metallurgist wishes to contact leading manufacturers of foundry supplies and raw materials for sales and service representation on West Coast. Address: Box 457, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Available who has years of successful experience in operating gray iron foundries at a profit. Came up the hard way and can pick the bad spots in any development of the business. Long experience in customer contract, sales and trouble shooting. Can be of value to president or chief executive of a company in possession of a foundry that needs its face lifted, scrap loss reduced and castings quality improved. Employed in the middle west at present but will go anywhere. For further particulars or interview address: Box 468, The FOUNDRY, Cleveland 13, Ohio.

PERMANENT MOLD FOUNDRY ENGINEER

Now engaged in producing permanent molds desires connection with nonferrous foundry now producing or contemplating the production of permanent mold castings. Familiar with both the metallurgical and mechanical problems of permanent molding, aluminum, magnesium and bronze. Can design and supervise construction of molds also operate or instruct others in operation of molds. Able to take complete charge of permanent mold foundry. Full or part time. Address: Box 476, The FOUNDRY, Cleveland 13, Ohio.

PATTERNSHOP

Why not have your patternshop pay its own costs and show a profit. Fast and experienced wood and metal patternmaker, foreman of larger shop or working foreman in small shop. Capable of estimating work layout from drawing to making patterns small or large and checking patterns and castings. Foundry experience in pattern mountings, gates and core box driers. Can teach apprentices fastest methods enabling rapid advancement. Address: Box 473, The FOUNDRY, Cleveland 13, Ohio.

PRECISION CASTING ENGINEER

Experienced all phases of production, precision casting, lost wax or matchplate—ferrous or nonferrous. Desires position in research, development or production. 14 years' experience. Married. Address: Box 474, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

MANAGER OR SALES ENGINEER

33, metallurgical engineering degree. 12 years iron and steel foundry experience as manager, development engineer, metallurgist and sales engineer. Address: Box 470, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

With 30 years' experience in steel or high-nickel alloy castings would like position in Middle West. Can furnish best of references. Address: Box 443, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

34, degree, practical experience in grey-iron mixtures, farm implements, automotive, machine tools and pressure castings, cupola operation, fuel substitution, natural and synthetic sands and facings, floor work and mechanized molding and sand handling systems. Address: Box 469, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRYMAN

Supervisory capacity with 20 years' experience in all phases steel foundry. Producing steel castings ranging from 1 pound to 3 tons. Good knowledge of foundry equipment, plant layout, foundry methods and high speed mechanized production. Thoroughly familiar with heading and gating and rigging of patterns for machine production, also sand slinger. Married. Age 43. Address: Box 432, The FOUNDRY, Cleveland 13, Ohio.

FOREMAN

Art, bronze or molder. High grade, experienced in all art bronze castings. Interested in position in Chicago district only. Address: Box 339, The FOUNDRY, Cleveland 13, Ohio.

FOREMAN

Can take full charge of small or medium size gray iron foundry. Western states preferred. Address: Box 431, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry, machine and related lines. Address: Box 871, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

B.S. degree, good practical steelmaking experience in acid electric. Experienced in sand testing and radiography and laboratory work. Also experienced in melting of grey iron in the electric furnace and in the cupola with a good knowledge of cupola operation. Now employed but desire position with better opportunity. Prefer midwest, but location is of secondary importance. Address: Box 465, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Practical molder and core maker with 26 years' experience as foundry superintendent. All classes of jobbing, rollover and squeezer. Mix by analysis. At present employed. Address: Box 869, The FOUNDRY, Cleveland 13, Ohio.

MALLEABLE FOUNDRYMAN

With 25 years' experience would like position as consultant on gating and scrap problems. Familiar with all phases of foundry operations. Address: Box 464, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM PERMANENT MOLD ENGINEER

Ten years of varied experience and proven ability in design and operation of molds. Capable of handling all operations, estimating to finished castings. Age 31. Address: Box 447, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGEMENT NOTE:

Do you want a progressive smooth running foundry with low scrap and good castings? Get a competent superintendent, experienced in iron, steel and manganese. Further details if interested. Address: Box 438, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Positions Wanted

FOUNDRY EXECUTIVE OR ENGINEER

Over 30 years' experience in mechanized iron and steel foundries, both jobbing and production. Just completed work on largest and most modern automotive foundry built since the war. If you contemplate mechanization, can save you money. Address: Box 462, The FOUNDRY, Cleveland 13, Ohio.

IRON FOUNDRY SUPERINTENDENT

PRACTICAL FOUNDRYMAN, TECHNICALLY TRAINED. EXPERIENCED ALL PHASES PRODUCTION BY PARTIAL AND COMPLETE MECHANIZATION. SUPERINTENDENT FIRST CLASS FOUNDRY PRODUCING 125 TONS DAILY. EXPERIENCED SETTING UP AN ORGANIZATION AND HANDLING LABOR. EAST OR MIDDLE WEST. ADDRESS: BOX 436, THE FOUNDRY, CLEVELAND 13, OHIO.

FOUNDRY EXECUTIVE

A graduate engineer with 20 years' experience as superintendent and plant manager desires permanent position. Wide knowledge of high production and jobbing of pressure and machine tool castings from gray iron and nonferrous metals. Address: Box 463, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Twenty-two years in machine tool foundries and others requiring cast iron of similar high quality. Superintendent and assistant for five years. Age 39. Now employed. Address: Box 442, The FOUNDRY, Cleveland 13, Ohio.

YOUNG FOUNDRY MANAGER

Fourteen years' experience in all phases of foundry work, supervision and management in both production and jobbing plants. An engineering graduate well qualified to give best results in any foundry assignment, steel and high alloy. Presently employed but desires more progressive employer. Address: Box 401, The FOUNDRY, Cleveland 13, Ohio.

OPEN HEARTH SUPERINTENDENT OR MELTING FOREMAN

Thirty years' experience making all kinds of steel for castings or ingots, basic or acid. Familiar with construction and operation of furnaces. Can furnish very best of references. Address: Box 354, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM PERMANENT MOLD FOUNDRY ENGINEER

TWENTY-FIVE YEARS' EXPERIENCE AIRCRAFT PARTS OR ANY INTRICATE WORK. FULL OR PART TIME. OHIO AREA OR METROPOLITAN NEW YORK LOCATION PREFERRED. ADDRESS: HAROLD C. HAASE, 557 SOUTH FOREST DRIVE, WEST ENGLEWOOD, NEW JERSEY.

FOUNDRYMAN

25 years' experience, patterns and castings. Dimensional quality control foundry troubleshooter. Engineering, pattern, casting and casting layout departments liaison. Address: Box 388, The FOUNDRY.

METALLURGIST

Experience in melting all types of grey and alloy cast irons with cupola and electric arc furnaces. Experience in melting carbon and alloy steels with basic and acid electric processes. Thoroughly familiar with all operations and capable of supervising chemical and physical control laboratories for any type of metal analysis. Familiar with metallography, quality control methods, heat treat operations, etc. Willing to work anywhere. Employed as process control chemist and metallurgist. Desires position as control metallurgist in supervisory capacity. Address: Box 458, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY CONSULTANT

With 45 years actual foundry experience specializing in problems of mechanical foundries, regulating production and reducing scrap. Address: Box 429, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

SUPERINTENDENT GENERAL FOREMAN

Twenty-five years' practical experience with ten years as molder and 15 years as foreman and superintendent of both jobbing and productive shop on castings up to 20 ton. Well versed in all departments including cupola, mixing metal, rigging and gating for fast production and best quality castings. Cost minded and can handle men. Address: Box 390, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

TOP FLIGHT FOUNDRY MANAGER AVAILABLE. EXPERIENCED IN ALL PHASES OF THE MODERN GRAY IRON FOUNDRY. MEEHANITE EXPERIENCE, TECHNICAL TRAINING, RESEARCH WORK, DEVELOPMENT AND SALES AND CUSTOMER CONTACT. THIRTY YEARS' EXPERIENCE. ADDRESS: BOX 477, THE FOUNDRY, CLEVELAND 13, OHIO.

COREROOM FOREMAN

Prefer coreroom with core troubles, jobbing or production coreroom. Large or small work, bench floor, rollover machines and coreblowers. Young, reliable, hard worker, good labor handler. Free to go anywhere. Address: Box 478, The FOUNDRY, Cleveland 13, Ohio.

COREROOM SUPERINTENDENT

20 years' experience specializing in sand control blowing machines, jobbing and production. Experienced in all kinds of coremaking, baking, fitting, assembling and pattern shops. Address: Box 479, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY OWNERS—NOTE

Do you have an unprofitable operation? Then communicate with an experienced operator with a reputation for taking foundries out of the red—37 years of age—19 years' practical and managerial experience in production and jobbing making castings up to 20 tons each. Experienced in labor relations, contracts, finances, purchasing and in shops employing 200 to 500 men. Educated in industrial engineering and plant management. Excellent references. Address: 480, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

Ferrous and nonferrous with both practical and technical training. A-1 metal man up-to-date on light and heavy castings. Capable of taking complete charge. Good connection more important than large salary. Address: Box 482, The FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN

Age 41, twenty years foundry work, fifteen years supervising production molding gray iron and steel. Understand sand control and know all phases of cupola operation and electric melting, alloying and heat treating. Familiar with sandslingers. Excellent references. Address: Box 483, The FOUNDRY, Cleveland 13, Ohio.

Open Capacity

OPEN CAPACITY

For small sand cast aluminum castings. 6 molding machines available. Good castings at reasonable prices. Send samples. ADDRESS: STANLEY ALUMINUM FOUNDRY, P.O. BOX 260, OCONTO, WISCONSIN.

OPEN CAPACITY

For all kinds of wood and metal patterns. Experimental, model and production. Master patterns a specialty. Let us estimate on your pattern requirement. Give us a trial and let's get acquainted. ADDRESS: MUNSON MILL MACHINERY COMPANY, 200 SEWARD AVENUE, UTICA, N. Y.

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.

Open Capacity

OPEN CAPACITY

Gray iron and aluminum castings. Specialize in gas burners and thin section castings. Address: INDUSTRIAL FOUNDRY & MFG. CO., SCHOOLCRAFT, MICHIGAN.

OPEN CAPACITY

Moved into our new modern foundry. Have open capacity for light and medium gray iron, brass, bronze and aluminum castings. Address: O.K. FOUNDRY CO., 1005 E. 9th Street Road, Richmond, Va.

Opportunities

COKE SAVINGS OF DOLLARS

per day is possible in nearly every foundry—reduction of total time of heat—resulting in quality metal. Get our report on your cupola. Semisteel is the purest—strongest—hottest metal made in cupola. Are you making it? Our system is an investment that brings returns worth many times the fee. Distance is no bar and remember you don't wade thru hundreds of pages only to learn the information has no bearing on the making of quality castings or how to keep your losses down. Advice is concise and a real treat for every man connected with the foundry. Information free.

McLAIN'S SYSTEM INC.
236 E. NORTH AVE. MILWAUKEE, WIS.

OPPORTUNITY

We can furnish at any point slack, fibre and tight barrels; also fibre and steel drums. Address: BUCKEYE COOPERAGE COMPANY, 3807 ORANGE AVENUE, CLEVELAND 15, OHIO.

Wanted-To-Buy

WANTED

Small used sand mixer, size 6 Baker-Perkins or size 0 Simpson.

FARRELL-CHEEK STEEL CO.
SANDUSKY, OHIO

FOUNDRY WANTED

Experienced foundry organization desires a grey iron foundry to operate on a profit sharing or rental basis. Have a successful record of operations and a market for castings.

EDWARD H. ZOLL
INDUSTRIAL REAL ESTATE BROKER
790 BROAD ST. NEWARK, N. J.

WANTED

2—No. 405-HD-19 Osborn jolt rollover pattern draw molding machine. In good condition. Address: Box 467, The FOUNDRY, Cleveland 13, Ohio.

PATTERNSHOP

Interested in buying patternshop or part interest. Experienced patternmaker in wood and metal, matchplate and precision casting. Can make shop pay profit. Address: Box 472, The FOUNDRY, Cleveland 13, Ohio.

BARBELL PLATE CASTINGS WANTED

Foundry equipped to quote poundage price on quality castings, painted and delivered, that will allow us to meet competitive prices. Our location is in North Jersey. Address: Box 454, The FOUNDRY, Cleveland 13, Ohio.

OIL OVEN

Commercial oil oven that will heat from one to 800 degrees. Address: Grayling Lamp Co., Solon, Ohio—Phone—TWinsburg 283K.

Classified Advertising

Wanted-To-Buy

MOLDING MACHINE WANTED

Rollover type 1500# capacity—to suit flask 30" diam 25" high—20" draw. Address: Box 451, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Stationary sand slinger and plate feed 220 volts, 60 cycle with 19" head and at least 16' swing radius. Beardsley & Piper preferred. Address: SWEDISH CRUCIBLE STEEL CO., 8561 BUTLER AVE., DETROIT 11, MICH.

WANTED

Patterns for grey iron mechanical banks. Address: F. S. JOHNSON, 502 WATER ST., MADRID, IOWA.

MIXER WANTED

No. 2 Simpson intensive sand muller, late model preferred. State condition, price and power characteristics. Address: Box 475, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Used 1ler draw crucible brass furnace complete No. 50, gas or oil. Address: Box 481, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOR SALE OR LEASE

Modern nonferrous foundry, wood and metal pattern shop, overhead sanding system. Dust and fumes collecting equipment. Wheelabrator and up-to-date cleaning machinery. Three acres of ground, 50,000 square feet of buildings and spur track. Can be converted to steel or iron at low cost.

ROGERS PATTERN AND FOUNDRY COMPANY

912 EAST 60th STREET

LOS ANGELES 1 PHONE CENTURY 2-9156

FOR SALE OR LEASE

Completely equipped gray iron foundry immediately available. Western Pennsylvania, Pittsburgh district. Two cupolas, one No. 7 Whiting, one 36" collieau. Positive pressure blowers, four 8ly tumbling barrels, Pangborn sand blast room, Pangborn sand blast barrel. Natural gas available. Pattern shop with wood-working power tools. Sheet metal shop with equipment. Address: Box 410, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE OR LEASE

Cast steel and gray iron foundry, 38,000 square feet floor aren. Central Pennsylvania location. Address: HARTLAND STEEL AND FOUNDRY CORPORATION, WEATHERLY, PA.

FOR SALE

Grey iron foundry located in the capitol city of the lumber industry. Lots of work. New building, acre of ground, patterns and good equipment. Address: VALLEY IRON & STEEL, 290 LASSEN ST., EUGENE, OREGON.

Foundries For Sale

FOUNDRY FOR SALE

Very profitable pouring 4 to 5 tons per day six days per week. Northern Pennsylvania. Only industry in town. $35,000 total price. Address: Box 446, The FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED POSITIONS
$3,500—$35,000

If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 DUN BLDG. BUFFALO 2, N. Y.

SALARIED PERSONNEL

$3,000—$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Foundry Mgr. Grey Iron—Steel	$8-$9000
Chief Plant Engr. Foundry	$7500
Metallurgist—Foundry experience	$7200
Supt.—Grey Iron	$6000
Industrial Engr.—Foundry Mchn. Shop	$6500

Send complete record. Confidential. Est. 34 yrs.

HARRISON PERSONNEL SERVICE
20 W. JACKSON BLVD. CHICAGO 4

For Sale

SPECIAL VALUES

Swindell Dressler electric arc furnace, capacity 1 ton complete with controls. Built in 1944, excellent condition.

Low lift platform trucks, 6,000 lbs. to 20,000 lbs. capacity.

Fork lift trucks and industrial cranes, 3, 5 and 10 ton on solid rubber or pneumatic tires. Krane Kars, Kochring and Link Belts.

No. 2 Climax wire straightener, capacity 1/16" to ¼".

WEBER MACHINERY CO.
1801 E. 21st ST. CLEVELAND, OHIO
CHERRY 7057

FOR SALE

1—American Foundry Equipment sand cutter. Completely overhauled. Gasoline motor driven. Will straddle sand pile 72" wide. Address: OHIO MALLEABLE IRON CO., COLUMBUS, OHIO.

FOR SALE

1—Oliver No. 103 Pattern Milling Machine, for wood and metal, complete with 5 HP., 3 phase, 60 cycle, 440 volt motor directly on the arm and a ¾ HP motor for the power hoist, together with other regular equipment, also with the following additional items:
1—732 special gauge for setting knives
1—640 cutter head, left hand
1—724 ideal universal cutter vise
1—Cabinet complete with blades
(All in excellent condition, having been used only a short time)

CARVER PUMP COMPANY
MUSCATINE, IOWA

NEVER USED—WILL SACRIFICE

One molding machine #559 jolt stripper made by Osborn Mfg. Co. One molding machine #442 jolt rockover pattern draw made by Osborn Mfg. Co.

THE ENTERPRISE MFG. CO. OF PA.
3rd & DAUPHIN STREETS
PHILADELPHIA 33, PA.

For Sale

LIST OF EQUIPMENT FOR SALE

16—J-275 Osborn Jolt Squeezers.
1—Model "AA" Sand Cutter.
1—Schramm Air Compressor, direct drive, 20 H. motor.
4—JDP Jolt Strippers.
5—"G" International 20 x 8 Rollover Machines.
4—Beardsley & Piper Screenarators.
1—Jeffrey Screenarator.
1—"Jr." Royer.
1—"B" Royer.
1—Swing Grinder, 5 H. Motor.
2—No. 1 Demmler core blowers.
2—No. 2 Demmler core blowers.
1—Tabor, air jolt, hand roll, 18 x 18, rollover machine.
1—Freeman core mixer complete with motor and switches.
1—American Wheelabrator 40 x 40 barrel.
2—Grinding Stands with 3 H. motor, V-belt drive, mounted on back of grinder, made by Hammond Machine Co.
1—#30 Beardsley & Piper Speedmuller with loading bucket and all motors and switches.
1—Blower—North American make, direct drive, G. & E. 5 HP. motor, 575 C.F.Ms., 20 oz. pressure.
1—Federal Electric Riddle.
4—Combs Electric Riddles.
1—Type "D" American Rod Straightener & cutter, Serial #86, air driven, it will cut off up to ¾" rod and straighten up to 1".
3—Flexible Jarvis Grinders.
2—Practically new, Timken Roller Bearing Ladles, made by Modern Equipment Co., Ladle Bowl 40 x 42.
1—Small Timken Roller Bearing Ladle, made by same company, 800 lb. capacity.
1—Lot of Ferro Silicon) This is
1—Lot of Ferro Manganese) crushed
1—Lot of Chrome) material.
15—50 lb. sacks of Ferro Silica.
3—Shakeout Vibrators.
1—24 x 42 tumbling mill—inside measurements
2—36 x 60 tumbling mills each one equipped with speed reducer and motor.
1—American sand cutter, electric driven, 52" cutting reel, 62" between wheels.
And many other articles too numerous to mention.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

ROTARY POSITIVE BLOWERS
IN STOCK TODAY!!!

28x30	6700 C.F.M.	7 lbs.
20x60	6150 C.F.M.	2 lbs.
20x30	4465 C.F.M.	3½ lbs.
16x24	3210 C.F.M.	5 lbs.
16x21	2125 C.F.M.	5¾ lbs.
16x48	4100 C.F.M.	2 lbs.
14x36	2500 C.F.M.	1½ lbs.
12x18	1500 C.F.M.	4½ lbs.
10x15	880 C.F.M.	3½ lbs.
10x7½	465 C.F.M.	10 lbs.
8½x29¾	1000 C.F.M.	2 lbs.
8x20	685 C.F.M.	2 lbs.
8x15	520 C.F.M.	4 lbs.
8x12	433 C.F.M.	3½ lbs.

And many smaller Roots-Connersville and Sutorbilt Rotary Positive Blowers, Spencer—Sturtevant—North American and General Blower Turbo Blowers. Also Steel Plate Dust Exhausters.

SEND US YOUR INQUIRIES.

WM. W. MEYER & SONS
SKOKIE—ILLINOIS
8309 NILES CENTER ROAD

FOR SALE
SAND HANDLING SYSTEM

Complete mechanized overhead sand handling system consisting of 19 individual moulders' hoppers, Beardsley & Piper Speed Mullor Model #50, Royer Magnetic separator, Jeffrey Pallet Conveyor #24 consisting of 360 feet of track and 59 cars, together with motors, conveyor belts and other parts pertaining to system.

PRICE $16,500.00 AT PLANT

OLD COLONY FOUNDRY COMPANY
EAST BRIDGEWATER, MASSACHUSETTS

FOR SALE

Used Universal tensile testing machine. Good condition. Type MP-10, motor driven, hydraulically operated. Address: Box 334, The FOUNDRY, Cleveland 13, OHIO.

Classified Advertising

For Sale

FOR SALE

1—NEW ELECTRIC LEAD MELTING FURNACE

Hoskins type FR 118 consisting of split type insulated cover—power transformer, 220 volt, 3 phase, 60 cycle primary, 73 volts secondary.

Complete automatic temperature control equipment for the above.

1—REBUILT COMPRESSOR

Serial #4529¾. Size 15 & 9¼ x 12, Class XCB-2 Air End Complete with Automatic 5 step clearance control, cylinders, piston, rod assemblies, new style channel valves, force feed rotary drive lubricator.

Performance

Piston Displacement C.F.M.	513-586
Speed, RPM	210-240
Air Pressure, pounds	100-100
B.H.P. required	85- 97
Actual capacity, C.F.M.	432-499

The V-belt drive is complete, consisting of Compressor sheave, motor drive and necessary ropes, catalog No. 9-D-240 15.0-54.0; Compressor speed 240 RPM, Motor speed, 875 RPM, Center distance between sheave 62.3".

1—Westinghouse Induction Motor, 100 HP Ball Bearing

1—Allen Bradley #640 100 HP 220 Volt, 3 Phase, 60 Cycle Serial #352790, Semi-Automatic Starter

1—Ingersoll Rand Air Aftercooler, Size 5, Class and Symbol 28-PL-12, Operation pressure 100#

1—Air Storage Tank

LINE MATERIAL COMPANY
12th AND MADISON AVE.
SOUTH MILWAUKEE, WIS.

FOR SALE

1500—Transite Core Plates, 12" to 24" square.
2—Hausfeld 400 GT oil fired tilting melting Furnaces.
1—Haynes Cast Iron 5 drawer Core Oven.
1—Osborn 605 Portable Rollover, Flask Cap. 54" x 24".
1—International Draw Down Stripper 30" x 72" YPD.
4—Osborn 2047 Rollover & Jolt Molding machines.
1—New Whiting worm geared Tea Pot Ladle.
1—Type M Screenarator.
1—Jeffrey Sanditioner.
100—#150 Crucibles.
1—Whiting Cupolette.
4—Sand Blast Cabinets.
1—Marschke 14" Swing frame Grinder.
Pneumatic Rammers.
Also Electric Motors, Air Compressors, Roller Conveyors, and other Foundry Equipment.

UNIVERSAL MACHINERY & EQUIPMENT CO.
320 BROAD ST.
SHILLINGTON, READING, PA.

MACHINERY FOR SALE

1—Nova Hoist with 15 H.P. Motor, including approximately $200.00 of spare parts, and with 2 Sasgen ½-ton Elevators, total cost $500.00 complete.
1—Shepard 5-ton hoist with approximately $100.00 spare parts, $250.00 complete.
3—1000 lb. capacity Fairbanks Wheelbarrow Scales $50.00 each.
3—Narrow gauge cars, 5-ton cap. $50.00 each.
1—1-Ton Shepard Electric Hoist like new, $550.00.

KEEN FOUNDRY CO.
GRIFFITH, INDIANA GRIFFITH 192

FOR SALE

3 Marschke 3-speed swing frame grinders. #SSJ x 4, 18" x 3" x 8" wheel, full belt guard—10 HP 220V 3 ph, 60 cycle 1750 RPM motor and control. Grinders in excellent condition. Address: HART & CROUSE CORP., BOX 395, UTICA, N. Y.

For Sale

FOR SALE
MOLDING MACHINES

2—J & J #610-B Portable Jolt Rollovers, tables 30" x 24", 10" Draw, Air Operated, Condition—GOOD
1—J & J #681-C Portable Jolt Strip, Table 30" x 25", 8" Draw, Air Operated, Condition—GOOD
1—Tabor Pedestal Type, Hand Ram, Hand Rollover, Pattern Draw, Table 20" x 14", Air Vibrator, Practically New
1—Osborn Model 76J Jolt Squeeze, Table 17" x 26", Air Operated, Condition—GOOD
Several Royer Sand Blenders, DC Current, Condition—FAIR

T. B. WOOD'S SONS CO.
CHAMBERSBURG, PA.

FOR SALE
FOUNDRY SUPPLIES

45 Tons Mexite Cupola and Ladle Addition; Bricquets: Boxed.
12 Tons Ferro-Manganese Bricquets
F.O.B. Columbus, Ohio
Price Reduction Items To Reduce Inventories.

MILLER FOUNDRY CO.
740 JENKINS AVE. COLUMBUS, OHIO

FOR SALE

Two (2) side door charge Heroult electric arc furnaces including shell, roof, mast, winch motor assembly, electrode assembly, tilting mechanism, tilt control panel stand. No transformer, no furnace control panel and no flexible power leads. In excellent condition. May be seen in operation until about March 7th.

One (1) Ajax 50 pound induction furnace, complete with control panel and required capacitors. No motor-generator nor bus bars are included. In excellent condition.

BOX 416
The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

2—Johnston and Jennings—No. 918 Jolt—Rollover Molding Machines—44" x 54" Bed. Reconditioned—2/3 the price of new equipment.
1—Beardsley and Piper—"Speedmullor"—Model 30. Good condition—2/3 the price of new equipment.
1—Lanly Double Core Oven—Two ovens 6' 5" wide, 7' high and 8' long with a common wall between them. Each oven is complete with gas heating equipment and individual Wheelco Recorder control. Core Racks available for these ovens. Good condition—½ the price of new equipment.
1—Gas Oven—built by the Industrial Oven Engineering Co.—6' wide, 7' 6" high, 11' long. Equipped with Leeds-Northrup Micromax Recorder and a Wheelco safety control. Can be used for aging aluminum alloy castings. Good condition—½ the price of new equipment.
1—Fisher Type IP-150 Iron Pot oil fired Melting Furnace—complete with hood, blower, North American burner and 24" x 16" x 13" iron pot—also equipped with Minneapolis-Honeywell automatic valve and complete temperature control equipment—½ the price of new equipment.
1—Redford Bench Core Blower #4-6-785 complete with clamping and drawing attachments—½ the price of new equipment.
1—Sly Sand Blast Cabinet 30" x 48" x 60"—complete with filter and motor—½ the price of new equipment.

THE PERMOLD CO.
MEDINA, O.

FOR SALE
FOUNDRY EQUIPMENT

1—Model 30 B. & P. Speedmullor
8—275J Osborn Jolt Squeezers
1—American Wheelabrator 42" x 48"
2—Model "S" B. & P. Screenarators
1—Gardner-Denver Air Compressor, 130 cu. ft. actual—V belt drive with motor
1—No. 2 Simpson Mixer, V belt drive

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO., NOT INC.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

For Sale

EQUIPMENT FOR SALE

MOLDING MACHINES
3—75J Osborn Jolt Squeeze
2—SPO #611-B Stationary, Oscillating, Jolt, Squeeze Strippers
1—SPO #4½ JHS Air Jolt Hand Strip
1—Tabor Plain Squeeze, Strain Rod Type
3—Mumford 3" Cyl. Core Jolt, with 20" x 15" Table
4—Osborn #36 core box drawing machines.
BLOWERS FOR CUPOLAS AND FURNACES
2—Spencer Turbine Cupola blowers 4100 CFM 16-oz, 25 HP direct connected motor
Maxon-Premix Blowers for Gas, ¼ to 1 H.P.
1—Connersville double geared rotary cupola blower, rated 24 cu. ft. per rev., maximum delivery 6200 CFM.
METAL MELTING EQUIPMENT
1—Hausfeld 2000# Aluminum Capacity Furnaces, Barrel Type, Open Flame, Oil Fired
3—Stationary Gas Fired #60 Crucible Furnaces, with ¼ H.P. Maxon-Premix Blowers
2—Monarch-Rockwell Rotating, 500# Brass, Oil New 32" to 41" Dia. Shell Cupolas made to order.
TUMBLING MILLS AND SAND BLAST
2—Pangborn No. 2 GH direct pressure type sandblast barrels, motor driven. Complete units.
1—Pangborn LE 6 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn LE 4 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn Sand Blast Unit including generating tank, shot cleaner, bucket elevator. Suitable for use with room.
MISCELLANEOUS
2—Ingersoll-Rand size LC-7 Air Hoists, 700# capacity.
1—Gardner-Denver air compressor complete with 5 HP 3/60/220 motor and controls.
4—Heavy duty flexible shaft grinders 2 HP.
30—1000 lbs. Capacity Budget Electric Hoists.
5—Low Lift Electric Trucks, 2000 lbs. capacity and up. Riding Operator Style.
1—Heavy Duty Back Geared Sprue Cutter, 1½" square knives, T & L Pulley Drive.
1—Fay & Egan 14" blade revolving, double arbor, tilting table, variety saw with roller table.
Miscellaneous Electrical and Gravity Conveyor Systems.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

FOR SALE

TURBO BLOWERS (3 Phase, 60 Cycle)

cfm	Pressure	Make	Motor H.P.	Volts	Speed
3500	40 oz.	Spencer	60	440	1800
2300	16 oz.	Spencer	15	220/440	3600
2200	40 oz.	Spencer	40	220/440	3600
1400	16 oz.	Spencer		220/440	3600
900	24	Spencer	15	220/440	1800
650	32	Spencer	10	220/440	3600
225	10	Spencer	1	220/440	3600
150	3 lbs.	Spencer	5	220/440	3600

PRESSURE BLOWERS (3 Phase, 60 Cycle)

2500	7 oz.	Sturtevant	15	220/440	1800
2400	14 oz.	Mahr	15	220/440	3480
1400	8 oz.	Robinson	5	220/440	3600
950	16 oz.	Nth. Amer.	7½	220/440	3600
660	20 oz.	A & B	7½	440	3600
550	20 oz.	A & B	5	440	3600
450	6 lbs.	A & B	30	220/440	3450
340	20 oz.	A & B	3	440	3600
250	12 oz.	Gen. Elec.	2	220/440	3600
150	12 oz.	Nth. Amer.	1	220	3600
150		McKee	1	440	3600

MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND, OHIO

FOR SALE

5 ton Whiting powdered coal fired holding furnace.
2—#193 Milwaukee jolt squeeze strip molding machines.

NYLEN PRODUCTS COMPANY
ST. JOSEPH, MICHIGAN

FOR SALE

New heavy duty motorized rod cutter, 65 cuts per minute; capacity: ¾ inch round hot rolled steel. Brand new. $890.00 f.o.b. Cleveland. Address: The Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.

Classified Advertising

For Sale

FOR SALE

WELDING POSITIONER — Ransome #16. 16000# Capacity. Table rotates and tilts under power. 220/440 motor driven, push button controls. Motor driven Model #6T Tailstocks. Serial #5509. TWO AVAILABLE FOR IMMEDIATE DELIVERY.

VIBRATING SCREEN — Tyler - Niagara Type #300. Serial #8733". Size—72" x 48". V-belted motor drive. Complete with gear reducers, sheaves, and Jeffrey Belt Conveyor Bucket Type Elevator.

SAND MIXER OR MULLER—Clearfield #610. Serial #225-C. NEW IN 1944. 72" dia. pan. Capacity for charge—10-14 cu. ft. Motor driven w/15 h.p. 220/440 volts motor. Complete with motor driven hoist.

JOLT SQUEEZE PATTERN DRAW MOLDING MACHINES—Johnson & Jennings. NEW IN 1943. Table size—15" x 21". Head Platen size—12" x 8".

HAND ROLLOVER POWER DRAW MOLDING MACHINE—SPO. Complete with run out car. Size inside frame—22½" x 72".

FALK MILL SUPPLY CO., INC.
18 WARD ST.
ROCHESTER 5, N. Y.

FOR SALE

1—International jolt rollover molding machine 20 x 8", type HDG, serial #58041-2. Can be inspected at our plant and immediate shipment made.

THE EASTERN FOUNDRY COMPANY
BOYERTOWN, PA.

FOR SALE

2—#125-175 hand tilt oil fired Stroman furnaces with blower and motor. 4—Type J centrifugal vertical molding machines. Address: ERTEL MACHINE CO., INC., 2045 MARTINDALE AVE., INDIANAPOLIS 7, IND.

For Sale

FOR SALE

(1) 3000# ladle, including all mechanism of gears, trunions, etc. Slightly used and in excellent condition. Available with or without lining.

HART MANUFACTURING COMPANY
2006 NORTHWESTERN PARKWAY
LOUISVILLE 3, KENTUCKY

EQUIPMENT FOR SALE

60 Sets—12" x 18" FP14 Flasks 4" cope and Drag
40 Sets—14" x 18" FP14 Flasks 4" cope and Drag
1 Only—Demmler No. 1 Core Blower. 10 x 12
2 Only—Adams 10 x 32 Jolt Squeezing Machines

WHEELING BRONZE CASTING CO.
MOUNDSVILLE, W. VA.

FOR SALE

Coleman drawer type core oven with maxon premix burner and motor complete. Address: PHILLIPS PATTERN WORKS, P.O. BOX 1143, MUNCIE, INDIANA.

FOR SALE

8—Tabor Stationary Jar Squeezers
15—80 lb. oil fired, crucible-type melting furnaces with covers, Hauck Burners and mixing valves
5—500 lb. oil fired Fisher Stationary Aluminum melting and holding furnaces with Hauck Burners and mixing valves
1—Tilting Furnace, 400 lb. crucible, equipped for gas firing
1—Royer Shakeout machine with motor
1—Lindberg Heat Treating Furnace — Type 2828-EH
2—Tannewitz Metal cutting saws, 36" and 42" wheels respectively
500—feet of 16" Roller Conveyors
250—feet of 24" Roller Conveyors

OLD COLONY FOUNDRY COMPANY
EAST BRIDGEWATER,
MASSACHUSETTS

For Sale

FOR SALE

100 HP Worthington 13 x 14 single stage water cooled compressor complete with V belt drive 100 HP, 3 Ph, 60 cy, 220-440 volt motor, motor starter. Excellent condition.

PEORIA CORDAGE CO.
1502 S. WASHINGTON ST.
PEORIA 2, ILL.

FOR SALE

One brand new model AS vertical centrifugal casting machine, 5 H.P., driving unit with speed range of 0-600 R.P.M. for operation on 220 volt, 60 cycle, 3 phase power, complete with control cabinet. If interested please reply—

BOX 435
The FOUNDRY CLEVELAND 13, OHIO

FOR SALE

(1) Ingersoll-Rand, type FS347, 4000 CFM, 125# pressure, 3500 RPM, direct connected motor driven centrifugal air blower with 30 HP motor, 220-3-60. No starter.
(1) Ingersoll-Rand, type G, 2200 CFM, 16 oz. pressure, direct connected motor driven centrifugal air blower with 15 HP motor, 220-3-60. No starter.

BOX 411
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE
GOOD CONDITION

10—Adams jolt squeeze machines 10-32" portable side rod type.
1—Beardsley-Piper heavy duty portable sand conditioner with magnetic pulley and screen. 60 tons per hour capacity, complete with motors and generator.

NEENAH FOUNDRY COMPANY
NEENAH WISCONSIN

CLASSIFIED ADVERTISING RATES

POSITION WANTED—Minimum advertisement set solid, 30 words, $2.00. Additional words 7c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $4.00. Additional words 12c each.

NOTE—If replies are to be sent to a box number in care of THE FOUNDRY, add 6 words to your advertisement for box number and address.

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3 inches	32.00	29.25	26.75	24.00
4 inches	40.00	36.75	33.25	30.00
5 inches, ⅛ col.	48.00	44.00	40.00	36.00
6 inches	58.75	53.25	48.00	42.75
7 inches	66.00	60.00	54.00	48.00
8 inches	73.25	66.75	60.00	53.25
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THE FOUNDRY

Penton Building, Cleveland 13, Ohio

FOR SALE

MODERN FOUNDRY MACHINERY AND EQUIPMENT

One conveyor line of 42 pallets, each pallet of ten-ton capacity; complete sand handling system; dust collector; return conveyor; automatic shakeouts and knockouts. Line now arranged with overhead sand distribution system for eight stations, and sand slinger with four stations.

One sand unloading system complete with track unloader, hoppers, elevator, cross conveyors, and seven steel sand storage bins.

One overhead Louden monorail core sand distribution system, complete with one electrified transporter cab and hopper and supporting steel.

Two Ingersoll-Rand air compressors, 1050 c.f.m.; 1600 c.f.m.

Hoists

2 Northern HiLift, electric, two-ton
2 Northern HiLift, electric, three-ton
1 Westinghouse electric, three-ton
1 Ingersoll-Rand "D", one ton
13 Ingersoll-Rand "D", two-ton

Air Blowers

3 North American, 1300 c.f.m. 10 HP motor
2 North American, 1050 c.f.m., 7.5 HP motor
1 Eclipse, 250 c.f.m., 3 HP motor
1 Fisher, 800 c.f.m., 7 HP motor
3 Large centrifugal blowers, complete with motors and drives.

Cranes

2 ten-ton Northern Hi Lift, 19 ft. span
7 ten-ton Northern Hi Lift, 16 ft. 7½" span
2 two-ton Northern, 16'7½" span
2 two-ton Northern, 22'9" span

Lift Trucks

2 Yale, 4000 lb. low elevating platform trucks
1 Yale, 4000 lb. high elevating platform trucks
1 Yale, 4000 lb. high tilting fork truck
2 Yale, 6000 lb. high tilting fork truck
3 Automatic Transporter Style P150 storage battery lift trucks

Core Blowers

1 Osborn No. 91
3 Osborn No. 94

Core Ovens

1 Despatch Vertical, 47 ft.
2 Despatch Vertical, 67 ft.

Welding Equipment

1 Stone-Ryals saw Blade Welder, Type MF 6
3 P. H. Arc Welders, 200 amp.
1 P. H. Arc Welders, 500 amp.

Dust Collectors

1 Dust collector-30HP motor
1 Rotoclone, Type D
3 Rotoclone, Type W

Grinders

5 Black & Decker-10 HP
2 Hammond-7½HP
2 Gardner #3D buffers
1 Cleveland buffer

Crucibles

5 1000 lb.
10 500 lb.

Furnaces

9 1000 lb. Fisher furnaces-type MNP (electric tilt)
2 500 lb. Fisher furnaces-type MNP (electric tilt)
6 500 lb. Monarch furnaces, type T (hand tilt)
14 500 lb. Monarch holding furnaces
2 500 lb. Holding pots
4 1800 lb. Romph furnaces
5 1000 lb. Monarch furnaces, type T (hand tilt)
2 500 lb. Bull ladles
2 32000 lb. Reverb., 9' x 14", open hearth

Molding Machines

4 Osborn Squeezer, 275 PG
1 Osborn Pin Lift, 712 J
6 Tabor Squeezer
1 Tabor Rollover, 40"
1 International Pin Lift, JDP
4 Osborn 405 Rollover
2 Tabor Rollover, 30"
3 Osborn 602 Rollover
11 Tabor Rollover, 22"
3 Osborn Rollover #147

Sand Blast Equipment

1 Pangborn Sand Blast with Dust Collector

Mixers

1 Beardsley & Piper Speed Muller

Storage Tanks

5 Steel sand storage tanks, 319 ton capacity
2 Steel sand storage tanks, 200 ton capacity

Saws

2 Tannewitz Band Saws—36"

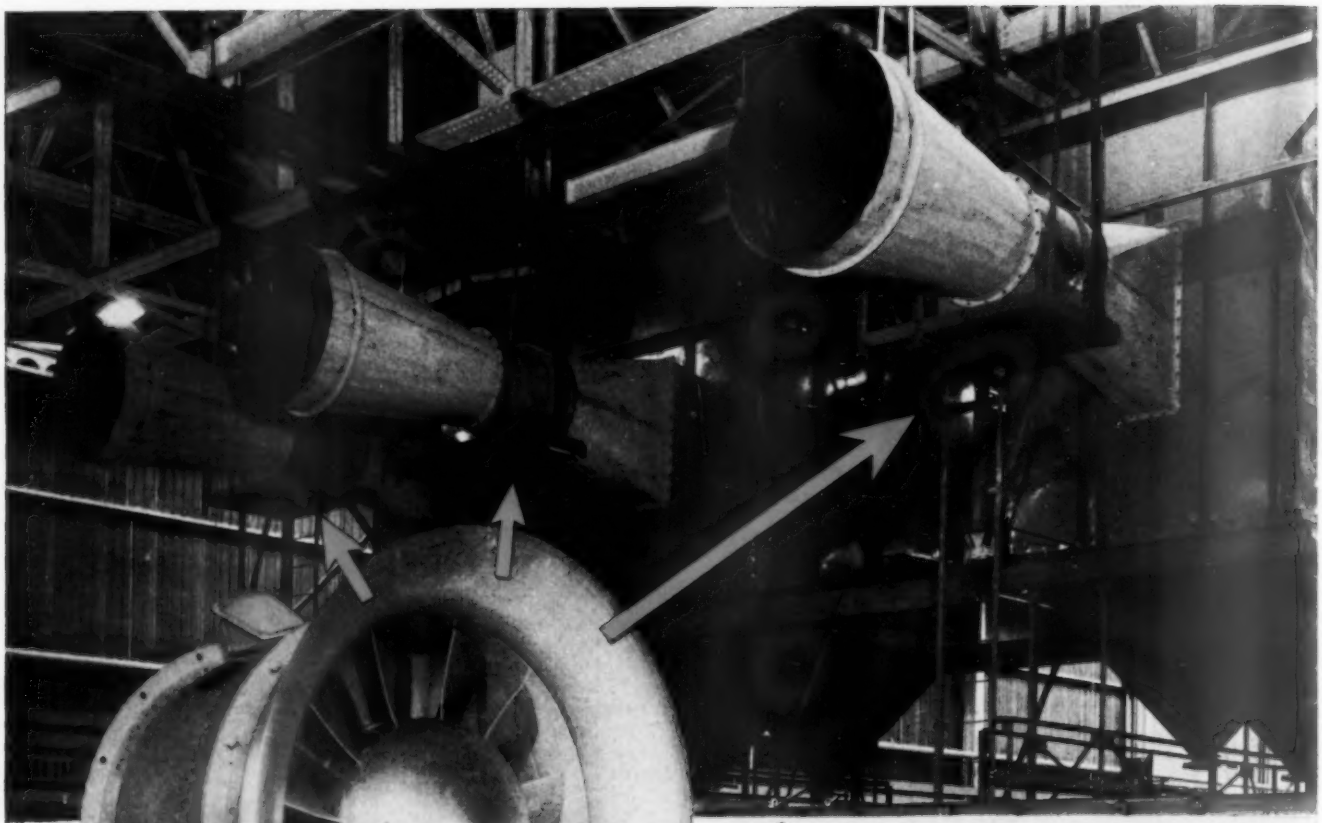
1 Complete Heat Treat Unit including tank and one 3-ton P & H Crane, span 36'7½".

Complete complement of steel and aluminum flasks.
Small tools and numerous spare parts.
Pattern shop equipment

The National Bronze & Aluminum Foundry Co.

East 45th and Hamilton Avenue

Cleveland 14, Ohio



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Write for Bulletin, or *Consult a Joy Engineer*

From every possible angle, JOY Series 1000 AXIVANE Fans will give you a better, lower-cost job. Their inline, vane-axial design is lighter and more compact; and they operate more quietly, require less power and space, and save greatly on installation time and costs. What's more, you get the extra flexibility of adjustable blades—an *exclusive* JOY feature—permitting easy and quick on-the-job regulation of pressure or volume over a wide operating range, with positive protection against motor over-load. ● Whatever your job is, JOY AXIVANE Fans can show you advantages—let us work with you.

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JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

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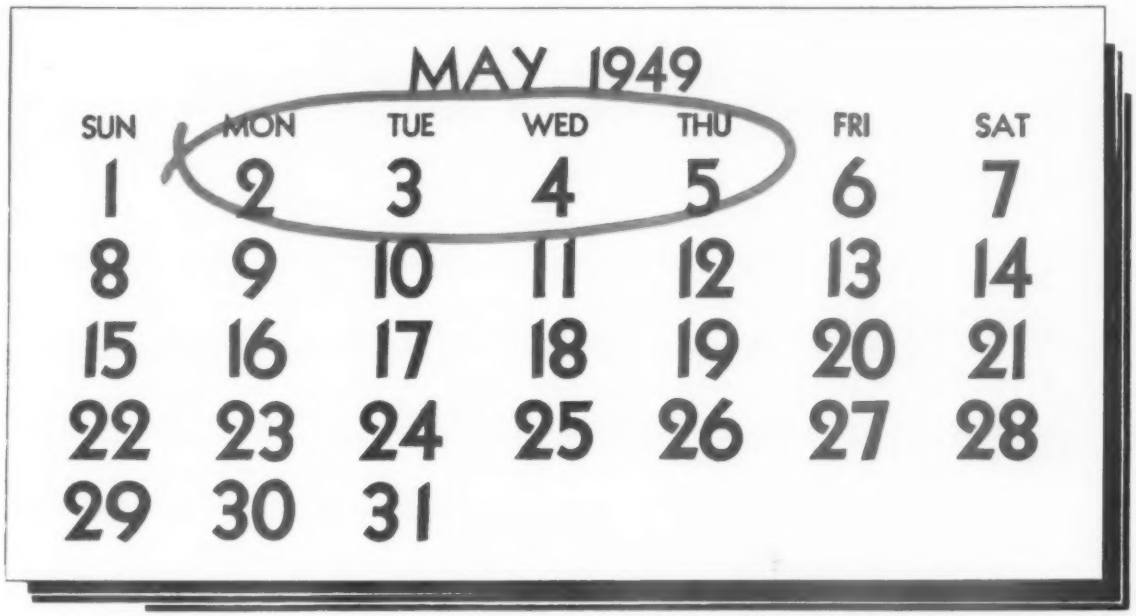
for St. Louis



53rd Annual
FOUNDRY CONVENTION AND CONGRESS

THE FOUNDRY

FOR MAY

THE PRE-CONVENTION ISSUE

This issue of THE FOUNDRY will constitute a complete preview of these important days and will contain information of interest and importance to the entire foundry industry—a complete resume of the program of meetings and an outline of the congress which will again this year be held in conjunction with the convention. All this in addition to the regular features to be found in any issue of THE FOUNDRY.

Copy Deadline April 1st

FOR JUNE

THE POST-CONVENTION ISSUE

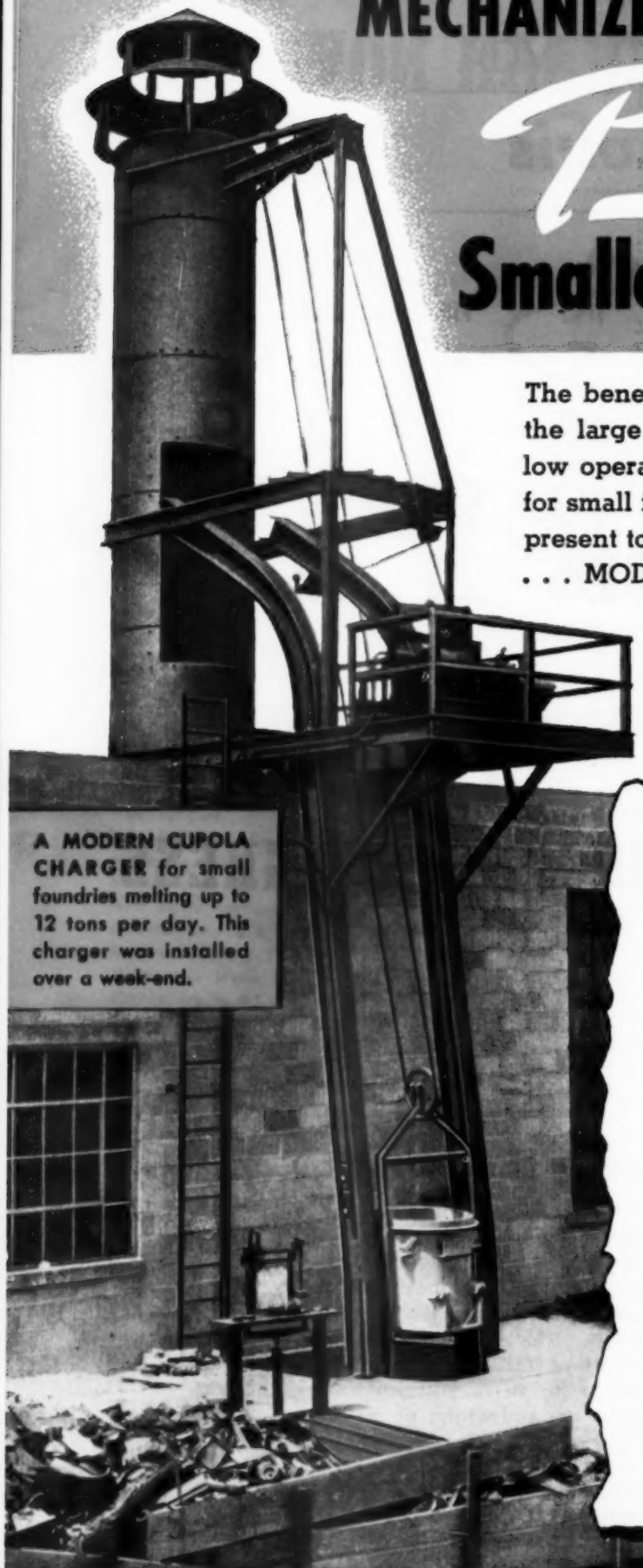
Of unusual importance this year will be the Post-Convention issue of THE FOUNDRY, reporting the many technical meetings with particular attention to the discussion of the part cast metals are playing in our industrial picture. The contents of the June Post-Convention of THE FOUNDRY will be valuable reading for all foundrymen whether they can attend the convention or not.

Copy Deadline May 6th

NOTE: **To all manufacturers and suppliers who in any way contact, sell and serve the foundry industry, these two issues of THE FOUNDRY present an invaluable advertising opportunity geared to important advancement in foundry practice and at a time when the eyes of the entire industry are turned on the St. Louis convention.**

THE FOUNDRY . . . Penton Bldg. . . . Cleveland 13, O.

MECHANIZED CUPOLA CHARGING *Pays Off* for Smaller Foundries Too!



A MODERN CUPOLA CHARGER for small foundries melting up to 12 tons per day. This charger was installed over a week-end.

The benefits of mechanical charging are *not* confined to the large foundry. Moderate cost, easy installation and low operating expense make MODERN Cupola Chargers for small foundries a profitable investment. Whether your present tonnage is a few tons per day or several hundred . . . MODERN EQUIPMENT CO. engineers can provide you with a Mechanized Charging System which will help you realize maximum benefits from present plant facilities, with less manpower. Write for Catalog 147-A.

CONSULT THE MODERN EQUIPMENT CO. REPRESENTATIVE IN YOUR AREA . . .

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McVOY HAUSMAN COMPANY
2024 Sixth Avenue, North

BUFFALO 14, N. Y.
M. L. DOELMAN
66 Russell Avenue

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ROBBINS & BOHR
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MAYER & OSWALD, INC.
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McARDLE EQUIPMENT CO.
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CHAMBERLAIN COMPANY
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3903 Olive Street

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CUPOLAS • CUPOLA CHARGERS • LADLE OF ALL TYPES • POURING DEVICES METAL POURING SYSTEMS • CRANE AND MONORAIL SYSTEMS • ELECTRIC CRANES

of the World!

GENUINE LEAK-PROOF

REG. U.S. PAT. OFF.

PISTON RINGS

For satisfied customers, greater profits and fool-proof jobs there's nothing like LEAK-PROOF Piston Rings. Use only Genuine LEAK-PROOF Piston Rings and you, too, will be sitting on top of the world. For they do the job *right*—right from the start. And remember... only McQuay-Norris wholesalers carry LEAK-PROOF!

GUARANTEED TO DO ALL 4

1. Keep oil down
2. Keep power up
3. Give smooth, new motor operation
4. Give longer life

YOUR CUSTOMERS KNOW ABOUT 'EM

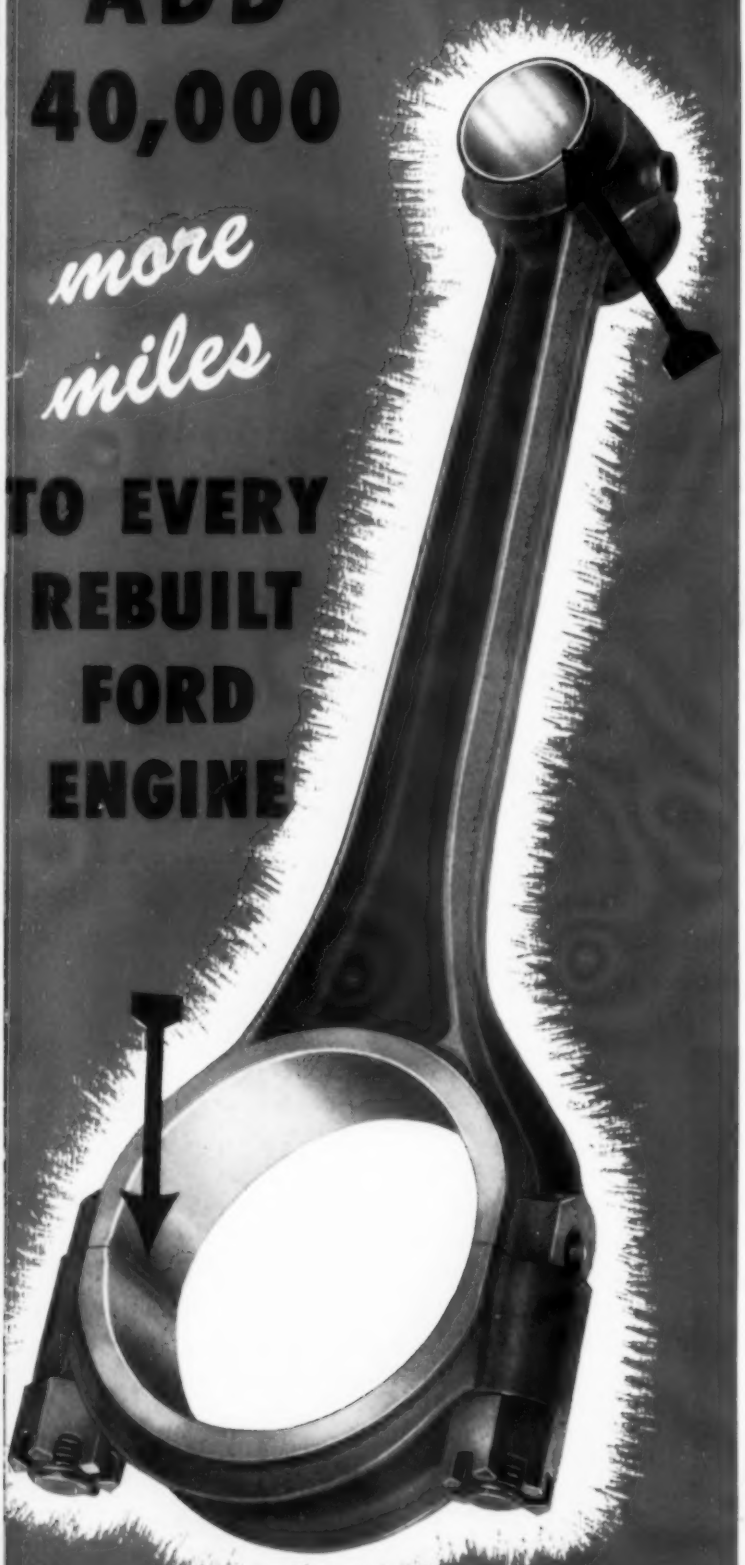
The most aggressively advertised piston ring set in the business, the name LEAK-PROOF is well known with car owners all over the country. They're easier to sell — completely acceptable—and they're priced *right* for you and your customers.

McQUAY NORRIS AUTO PARTS

MANUFACTURING CO. ST. LOUIS 10, MO.

TEN YEARS OF RIGID TESTS

ADD 40,000 more miles TO EVERY REBUILT FORD ENGINE



MIDLAND MANUFACTURING CO.

THE REBUILT ENGINE

☆

Specialized Equipment and Personnel Give It the Quality of a New Engine

☆

GIVEN AN engine that has been rebuilt by trained personnel using precision equipment, that engine will in every respect be as good—if indeed not better—than it was in its original new state.

It must be remembered that metal has many peculiarities and in time any internal strains become less severe so that a sort of "aging" takes place. Then, when such metal parts are reconditioned or remachined they "stay put" over long periods. It is one of the reasons why a properly rebuilt engine gives the car owner as many or more efficient miles of transportation as did the engine of his car when new.

Good engine rebuilding is in a sense re-manufacturing because the shop doing this work is fully equipped with machine tools, fixtures and gages that closely approximate standard factory practice.

As a matter of fact the individual operations encountered in rebuilding are done by specialists whereas in factory production, the operator performing a certain routine job may be skilled in that one operation only and yet be totally ignorant of the relationship existing between the many parts of an engine. The rebuilt engine has much to recommend it. It stands to reason that when engines show a falling off in power, get smoky, start hard, run a temperature and so on that there has been a gradual deterioration from original standards. Parts are worn, clearances have become abnormal and in general the engine is protesting against wearing out.

Sometimes it is possible to effect a few repairs and installation of new parts to restore in part the efficiency of the engine. But when the time comes for new pistons, rings, rods, bearings and so on, it stands to reason that the only sensible plan is to go entirely over the engine and literally rebuild it from the ground up. Dealers everywhere have found out that the rebuilt engine is the customers' best bet. He gets many thousands of trouble-free mileage, that new car feel, good economy and a realization that all parts are up to standard quality.

Take the crankshaft, for example. It is the backbone of the engine and the starting point in the rebuilding program. The engine rebuilder checks it by precision methods and either regrinds it to required specifications or if his findings so dictate replaces it with a genuine approved part.

In regrinding the shaft the main and connecting rod journals are reground to a mirror finish, to exact size so that standard replacement parts can be fitted. Precision micrometers check all bearing surfaces on the shaft before assembly is made.

5 IMPORTANT FEATURES HELP

GOOD ADHESION
PROPER SUSPENSION
CORRECT PENETRATION
UNIFORM COVERAGE
HEAT RESISTANCE

Stevens "Balanced" CORE and MOLD COATINGS

Cut Casting Cost

WHERE IT COUNTS THE MOST

Cutting Costs "counts the most" where it's possible to minimize scrap and casting repair, as well as eliminate excess blasting, chipping or grinding. That's the dedicated purpose of every Stevens *quality-controlled* core and mold coating.

When you see a clean, smooth casting shaken out of a mold requiring but a minimum of tumbling, brushing or blasting to finish and see it happen not once, but hundreds or thousands of times as the case may be . . . you can bet your bottom dollar it's only because some cost-conscious foundryman left no stone unturned to find a better core and mold coating for that job.

We'd like to think that that foundry operator is a Stevens customer and friend . . . for it has been our privilege and pleasure to serve such men for more than half a century. During that time we've developed innumerable "job-proved" coatings, any one of which might answer *your* specific needs . . . whether you're pouring gray iron, brass, bronze, aluminum, steel or magnesium.

It will pay you to get a true estimate—not a guesstimate of the core and mold coating best qualified to answer your particular purpose.

We could go on *talking* good coatings and build a story around the laboratory and production control which guarantees the consistent uniformity of every Stevens coating whether it be of a graphitic, carbonaceous or refractory nature, but we'd rather *show* you on your job just what a "qualified" coating can mean in terms of production savings for you and your company. That's the *only* evidence we ask you to believe. Let us prove our point in your behalf. We'll let results speak for themselves.

SINCE 1882 — FREDERIC B. STEVENS INCORPORATED — DETROIT 15, MICHIGAN — EVERYTHING FOR A FOUNDRY

LEADING MANUFACTURERS AND DISTRIBUTORS OF FOUNDRY EQUIPMENT AND SUPPLIES

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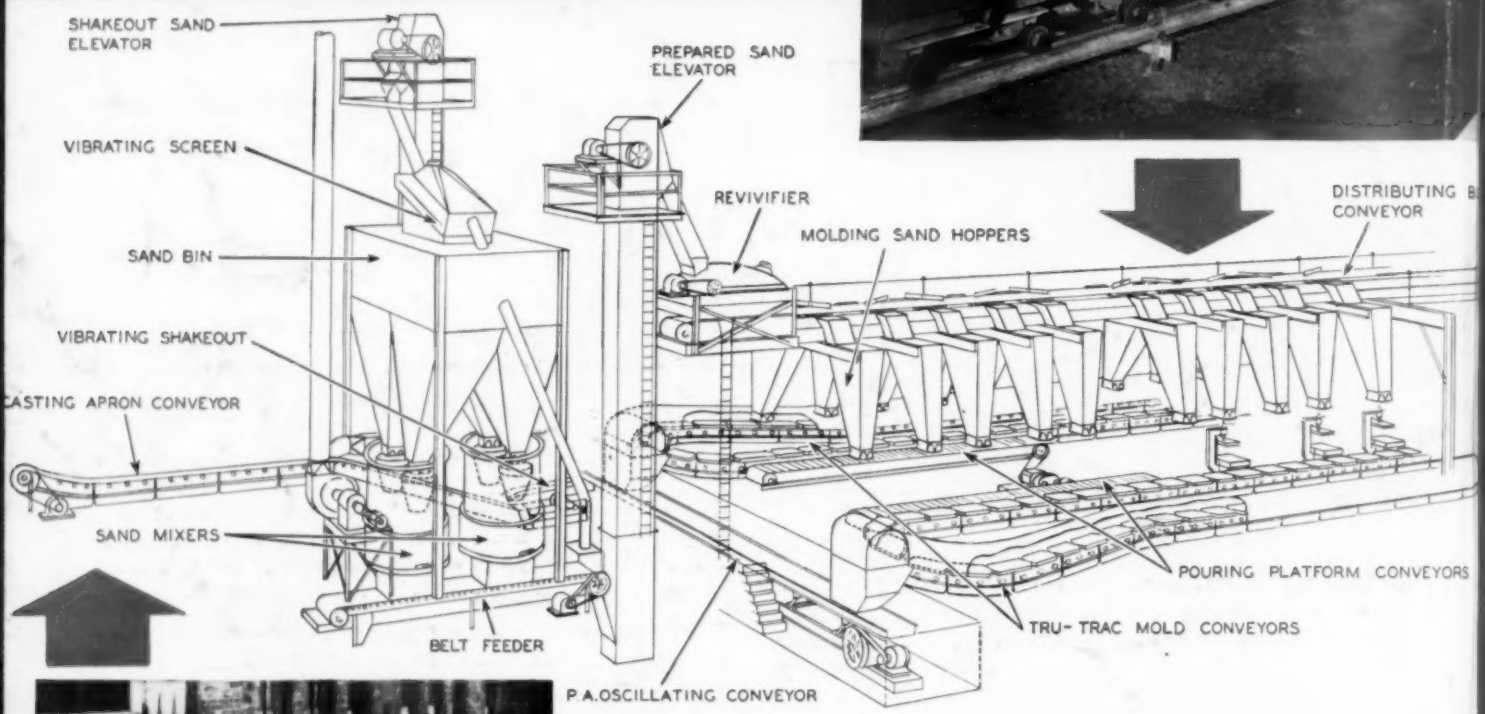
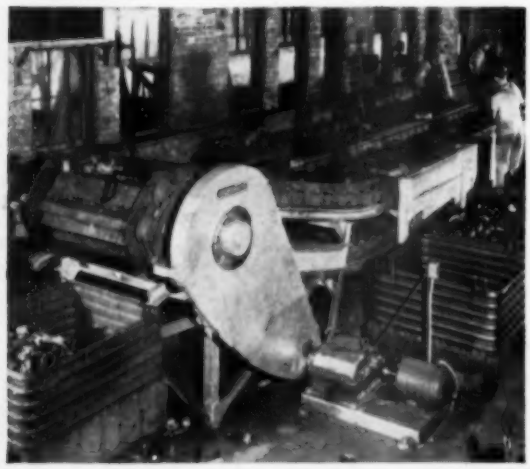
FOUNDRY EQUIPMENT AND SUPPLIES DIVISION

LINK-BELT CONVEYOR MECHANIZATION

Improves Working Conditions in the foundry of NATIONAL SEWING MACHINE CO.





Triples production—eliminates smoke

National Sewing Machine Company of Belvidere, Ill., has taken full advantage of mechanization in their foundry. Production has increased, resulting in lower costs and working conditions have improved.

This Link-Belt mechanized foundry assures continuous production of quality castings due to properly prepared and controlled sand which is conveyed to molding stations and reclaimed from automatic shakeout, in a closed circuit, to sand preparation plant.

Molds are conveyed on Tru-Trac mold conveyor through pouring, cooling and automatic dumping station.

The accompanying sketch and picture illustrate some of the modernization accomplished. This Link-Belt system has complete dust collection, to eliminate dust and smoke, also castings handling from shakeout screen for continuous flow of castings.

What's your mechanization problem?

11.270

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

THE SYMBOL OF QUALITY LINK-BELT

LINK-BELT CONVEYORS

AND PREPARATION MACHINERY

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT